

DULCOMETER DCM510® Aquatic Water Quality Controller

Use your Tablet or Smartphone. I'm WiFi ready!



Please carefully read these operating instructions before use! - Do not discard this manual! The operator shall be responsible for any damage caused by installation or operating errors! Technical changes reserved

DCM510 Browser

Contents

| | | |
|-------|---|----|
| 1 | Day-to-Day Browsing | 4 |
| 1.1 | The WiFi Connection..... | 4 |
| 1.1.1 | Using a PC:..... | 4 |
| 1.1.2 | Using a Tablet | 5 |
| 1.1.3 | Using a Smartphone | 6 |
| 1.1.4 | Opening the Browser page using WiFi..... | 8 |
| 1.2 | The LAN Connection to a Windows PC or Building Network..... | 9 |
| 1.2.1 | Connecting to a PC | 9 |
| 1.2.2 | Connecting to the building network | 12 |
| 1.3 | The Home Screen 1 of 2 | 13 |
| 1.4 | Home Page Services | 14 |
| 1.4.1 | Log-In..... | 14 |
| 1.4.2 | Home Page Detail..... | 15 |
| 1.4.3 | Home Page System Icons | 17 |
| 1.4.4 | Create a Report 1 of 3..... | 17 |
| 1.5 | View & Adjust Setpoints 1 of 2..... | 20 |
| 1.6 | Priming-Testing Pumps, Feeders & Solenoids | 22 |
| 2 | Chemical Feed Controls: Oxidant, Acid..... | 23 |
| 2.1 | Sensor Controlled Feeds 1 of 2..... | 23 |
| 2.2 | Time Modulation | 25 |
| 2.3 | Timed Cycling | 26 |
| 2.4 | PID Controls (Relays 6 through 9 only) | 27 |
| 2.5 | Control During Events | 28 |
| 2.6 | Limiting Feed & Alarms..... | 29 |
| 2.7 | Interlocks - No Feed on No Flow | 30 |
| 2.8 | Blocking-Delaying a Feed | 31 |
| 2.9 | Feed Diagnostics 1 of 2..... | 32 |
| 3 | Events: Feeding by Time & Date | 34 |
| 3.1 | Setting & Viewing Events 1 of 2 | 34 |
| 3.2 | Alarm Relay..... | 36 |
| 4 | Sensors: Amperometric, pH, ORP, Corrosion, Conductivity | 37 |
| 4.1 | Sensor Setup 1 of 2 | 37 |
| 4.2 | Sensor Compensation | 39 |
| 4.3 | Sensor Calibration..... | 40 |
| 4.3.1 | DPD: Oxidant Sensors..... | 40 |
| 4.3.2 | pH Dual Buffer Calibration 1 of 2 | 41 |
| 4.3.3 | 4-20mA Input Loop Calibration 1 of 3 | 43 |
| 4.3.4 | Inventory Calibration..... | 46 |
| 4.4 | Sensor Alarms..... | 47 |
| 4.5 | Sensor Diagnostics 1 of 3 | 48 |
| 4.6 | Using Sensor Attributes for Phantoms 1 of 2..... | 51 |
| 4.6.1 | Combined Chlorine | 51 |
| 4.6.2 | Langeliers Saturation Index LSI..... | 52 |
| 4.7 | Inventory: Using feed meters & pumped volumes..... | 53 |
| 5 | Water Meters | 54 |
| 5.1 | Configuring a New Meter | 54 |
| 5.2 | Flow Rate Alarm..... | 55 |
| 5.3 | Pulse to Analog Output..... | 56 |
| 5.3.1 | Configuration of a VFD control output 1 of 3 | 56 |
| | Configuration of a VFD control output 2 of 3 | 57 |
| | Configuration of a VFD control output 3 of 3 | 58 |
| 5.4 | Meter Diagnostics | 59 |
| 5.5 | Meter Alarms | 60 |
| 6 | Flowswitches, System Interlocks & Contact Sets | 61 |
| 6.1 | Switching Meters & Contact Sets | 61 |
| 6.2 | Contact Set Alarms | 62 |

DCM510 Browser

| | | |
|--------|--|----|
| 6.3 | Inverting a Contact Set | 63 |
| 7 | Frequency Controlled Pumps | 64 |
| 7.1 | Adjusting mL/stroke | 64 |
| 8 | 4-20mA Outputs | 65 |
| 8.1 | Configure: Manual-Auto Switch..... | 65 |
| 8.2 | Calibrate 4-20mA Outputs | 66 |
| 8.3 | Diagnostic – 4-20mA Outputs | 67 |
| 9 | System Settings | 68 |
| 9.1 | Home & Diagnostic pages | 68 |
| 9.2 | Activity Log:..... | 69 |
| 9.2.1 | User ID, time stamp..... | 69 |
| 9.3 | Communications: | 70 |
| 9.3.1 | LAN IP, Netmask, MAC, Gateway, Wifi IP | 70 |
| 9.4 | Time & Date: | 71 |
| 9.4.1 | Sync to Device..... | 71 |
| 9.5 | E-Mail Setup – Test | 72 |
| 9.6 | Enable I/O:..... | 73 |
| 9.6.1 | Enable IO, Assign to System# | 73 |
| 9.7 | System Setup: | 74 |
| 9.7.1 | Naming, Sunday=Day1 ,Metric Units, Restart Options | 74 |
| 9.8 | User Setup:..... | 75 |
| 9.8.1 | View-Set Access Level and Passwords | 75 |
| 10 | Using the USB Port..... | 76 |
| 10.1 | Capturing Data..... | 76 |
| 10.2 | Save or Load the Program Configuration | 77 |
| 10.2.1 | Saving to the USB | 77 |
| 10.2.2 | Loading from the USB | 77 |
| 10.3 | Firmware Upgrade | 78 |
| 10.4 | E-mail Reports and Alarms..... | 79 |
| 10.4.1 | E-mail Types: | 79 |
| 11 | Appendices: | 80 |

Sidebar: Are used to relate helpful tips and default settings as well as explain typical uses for feed and control functions.

DCM510 Browser

1 Day-to-Day Browsing

The purpose of this manual is to show the user how to connect to the DCM5 controller using an Ethernet connection, or wirelessly via WiFi from a PC, tablet or smart phone. Secondly, to give examples of how to program the outputs, calibrate sensors and/or view the process.

The Installation and Operation manual has detailed sensor information, keypad instruction and controller details and specification.

The following sections detail connecting your smart device or PC to the controller. WiFi has the advantage of not requiring a physical cable. LAN setup follows this chapter, then the Home screen is explained as it is common to either connection method.

1.1 The WiFi Connection

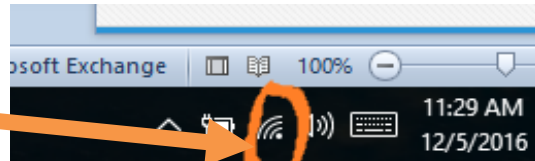
A **WiFi** connection eliminates cables and the need to change your IP address.

There are two steps needed to fully connect to the controller. **Step 1:** Connect your device to the wireless network that includes your controller. **Step 2:** Enter the IP address of the controller in a browser app. There could be multiple devices on this network.

Step 1 is provided in three parts, [1.1.1 Using a PC](#), [1.1.2 Using a Tablet](#) and [1.1.3 Using a Smartphone](#)

1.1.1 Using a PC:

Click on the **WiFi** icon on your desktop.



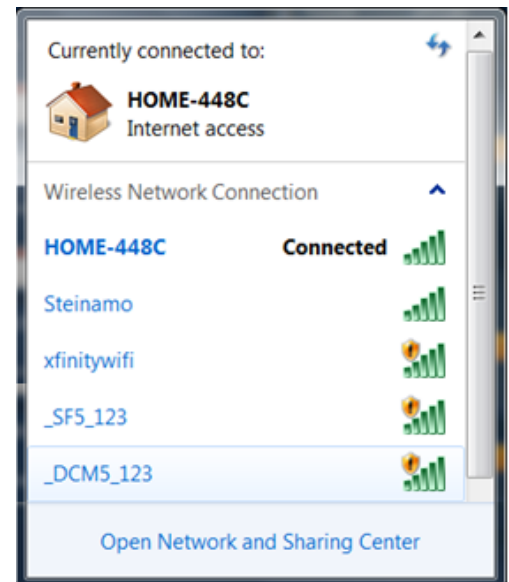
Click on the `_DCM5_123` choice and press the Connect button.

The number **123** in this example will be different on each controller. These 3 digits are taken from the last 3 digits of the controller serial number. This allows you to differentiate between controllers if more than one is within **WiFi** range.

Further differentiate your controller WiFi name by changing the SSID name of the network. See [9.3 Communications](#)

Your computer is now connected to the DCM5 **WiFi** network.

Continue with section [1.1.4 Opening the Browser page](#)



Sidebar:

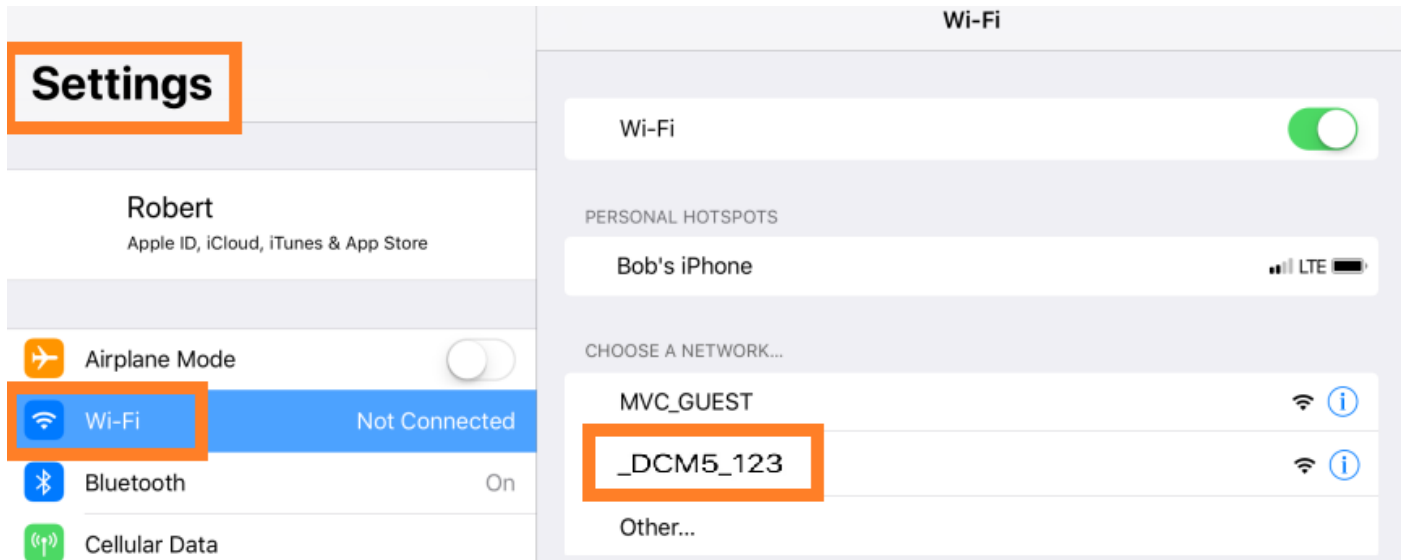
Once you are connected to a controller, you can edit the SSID (WiFi name) to make identification easier than trying to remember the three digits.

See section [9.3 Communications](#) to make this change.

DCM510 Browser

1.1.2 Using a Tablet

Open the settings page on your Tablet. Select the Wi-Fi icon. Select the DCM network.



The number **123** in this example will be different on each controller. These 3 digits are taken from the last 3 digits of the controller serial number. This allows you to differentiate between controllers if more than one is within **WiFi** range.

Further differentiate your controller WiFi name by changing the SSID name of the network. See [9.3 Communications](#)

Your computer is now connected to the DCM5 **WiFi** network.
Continue with section [1.1.4 Opening the Browser page](#)

Sidebar:

Once you are connected to a controller, you can edit the SSID (WiFi name) to make identification easier than trying to remember the three digits.
See section [9.3 Communications](#) to make this change.

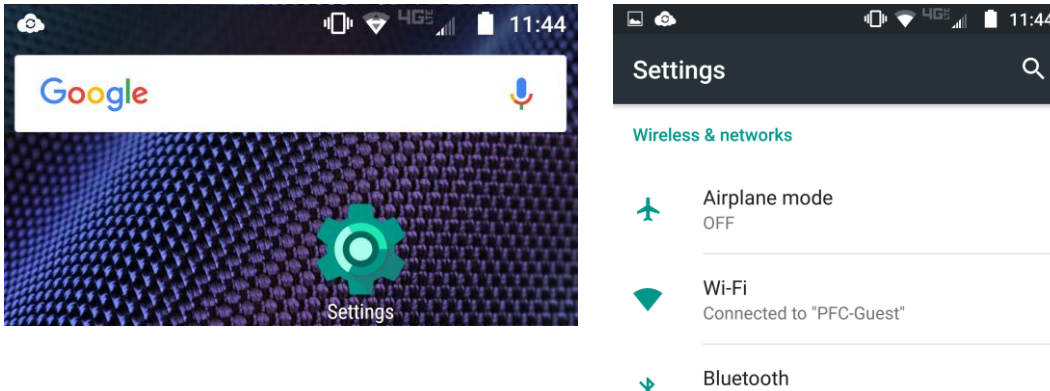
DCM510 Browser

1.1.3 Using a Smartphone

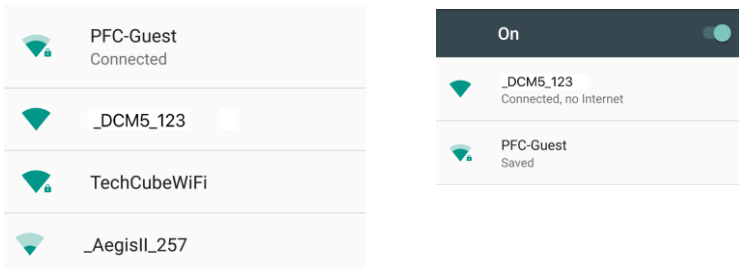
Here are Smartphone examples using Android and iPhone;

1.1.3.1 Setting up WiFi using an Android phone

From your home page, press the settings button then choose Wi-Fi.



There may be more than one controller nearby. Choose your controller by comparing the serial numbers last 3 digits with the options on the phone. Select your controller. The status should change for that choice. See example picture below; DCM5_123 is 'Connected, no Internet'.



The number **123** in this example will be different on each controller. These 3 digits are taken from the last 3 digits of the controller serial number. This allows you to differentiate between controllers if more than one is within **WiFi** range.

Further differentiate your controller WiFi name by changing the SSID name of the network. See [9.3 Communications](#)

Your computer is now connected to the DCM5 **WiFi** network.
Continue with section [1.1.4 Opening the Browser page using WiFi](#)

Sidebar:

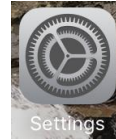
Once you are connected to a controller, you can edit the SSID (WiFi name) to make identification easier than trying to remember the three digits.

See section [9.3 Communications](#) to make this change.

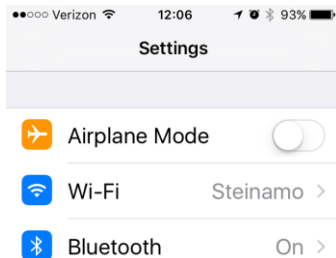
DCM510 Browser

1.1.3.2 Setting up WiFi using an iPhone

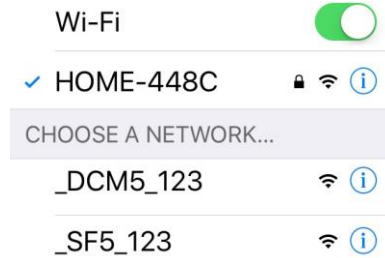
To connect your iPhone to an DCM5 controller, make a **WiFi** connection;
Select the Settings button from your desktop.



Select the **WiFi** button.



Choose your controller.



Note the connection status.



The number **123** in this example will be different on each controller. These 3 digits are taken from the last 3 digits of the controller serial number. This allows you to differentiate between controllers if more than one is within **WiFi** range.

Further differentiate your controller WiFi name by changing the SSID name of the network. See [9.3 Communications](#)

Your computer is now connected to the DCM5 **WiFi** network.
Continue with section [1.1.4 Opening the Browser page](#)

Sidebar:

Once you are connected to a controller, you can edit the SSID (WiFi name) to make identification easier than trying to remember the three digits.

See section [9.3 Communications](#) to make this change.

DCM510 Browser

1.1.4 Opening the Browser page using WiFi

Once a WiFi connection is established, continue here with step 2. To connect to the controller and see the screen, open a browser and enter the controller's **WiFi** IP address. (Not the LAN IP). The default address is 192.168.1.1. This address cannot be changed. Find the controller **WiFi** IP address using the controller keypad.

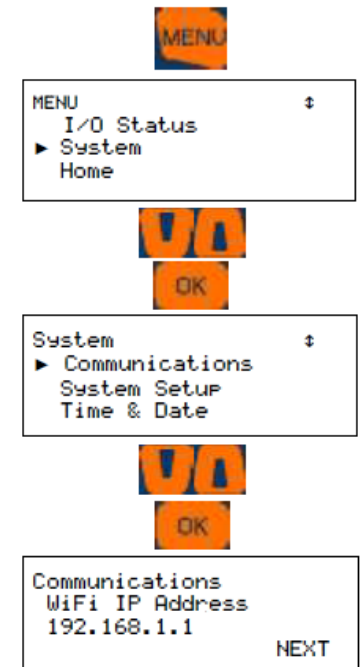
- 1) Press the Menu key
- 2) Press the up arrow (scroll up) until you see System. Press OK
- 3) You should be at the Communications menu. Press OK.
- 4) You will see the LAN IP address. Press the down arrow twice to see the WiFi IP Address. This is the address you need to use in the browser URL box. No need to add the WWW or Http. Just enter as shown here. 192.168.1.1 and press your return key.

Once connected, you can see values and status of many I/O point but you will not be able to edit or make programming changes without logging in. This is the **HOME** screen.

See section **1.3 The Home Screen**



Connection status



DCM510 Browser

1.2 The LAN Connection to a Windows PC or Building Network

Set up the Local Area Network (LAN) connection to facilitate connecting a PC or to ready the controller for connection to the building network. This requires an Ethernet CAT5 cable.

1.2.1 Connecting to a PC

If connecting to your PC, you will need to set up your computer's Ethernet port to match the address of the controller.

The Ethernet cable no longer needs to be a 'crossover' type unless you are running a Windows version earlier than VISTA. WIN7 onward will determine which wires need to be transmit and receive and adjust to match the signals on the cable.

Attach the cable to the LAN port on your PC and to the LAN port inside the controller. (Lower left-hand corner). A green light should be seen on both ports. The amber light will blink with each packet that passes by in either direction.

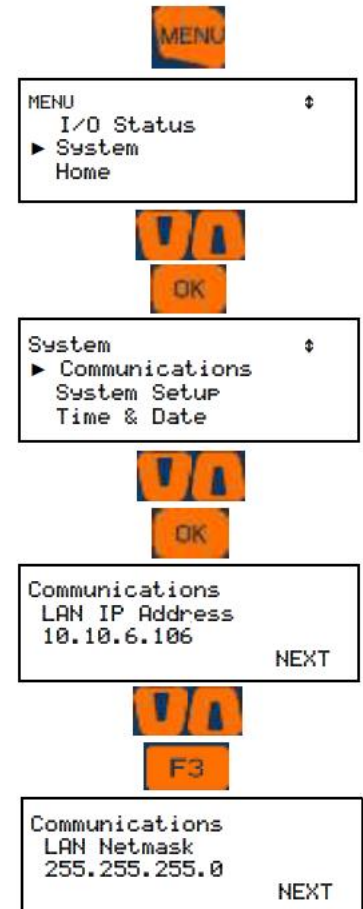
1.2.1.1 Determine the LAN IP address of the controller

The controller's default LAN IP address is 10.10.6.106 and the LAN Netmask is 255.255.255.0.

Verify these numbers;

Press the menu key on the controller
Use the up arrow to System and press Enter
Press Enter for Communication
The LAN IP address is shown

Once you have determined the IP address of the controller, you need to set a static IP address on your PC that is compatible with the controller address.



DCM510 Browser

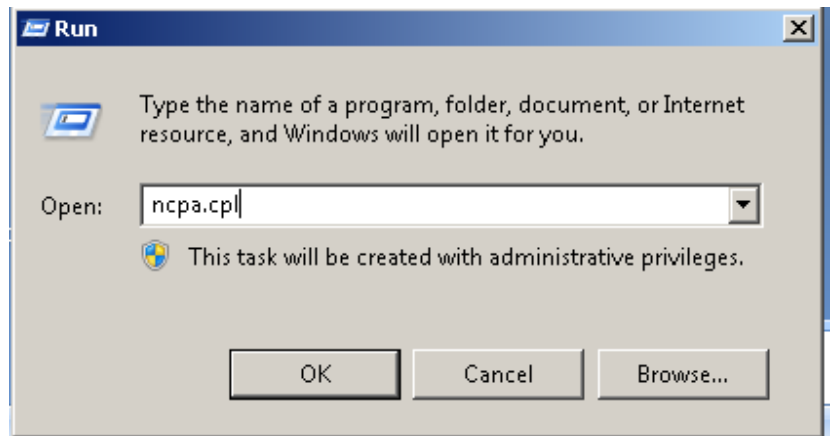
1.2.1.2 Setup the Local Area Connection on your PC

Depending on which version of Windows you are using, these instructions will vary. The idea is to set a compatible static IP address on your PC for the Ethernet port you will use to physically connect to the controller.

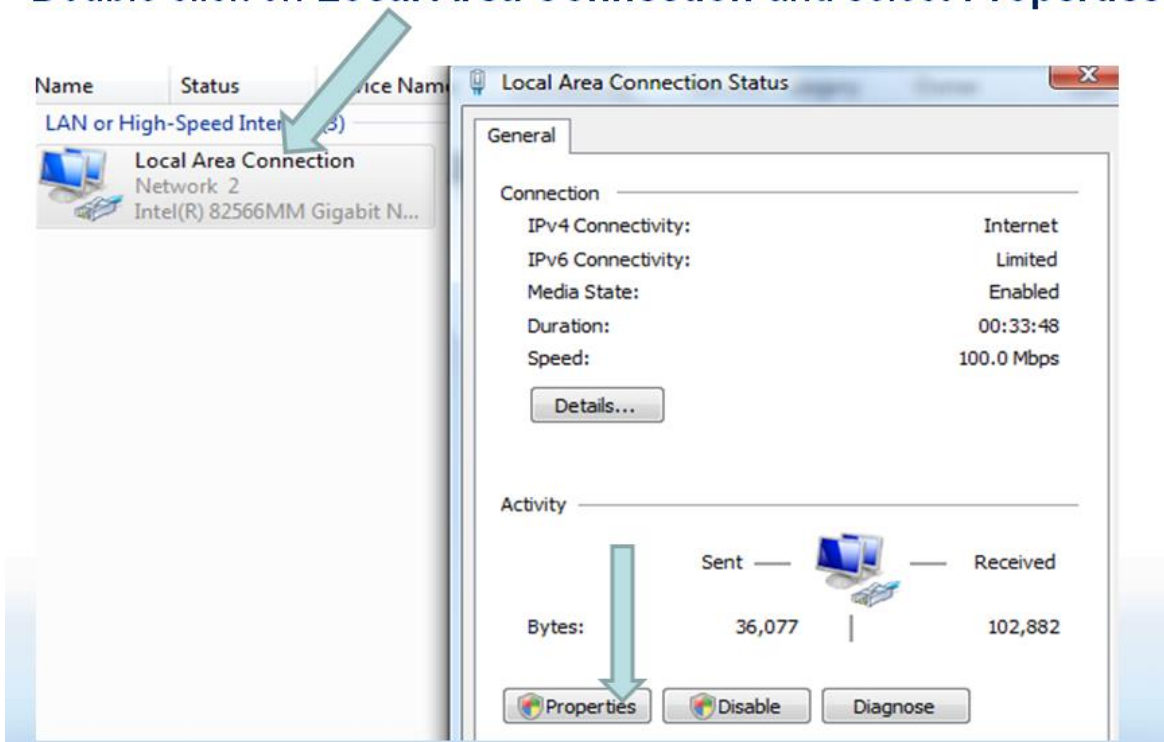
Use the following instructions for VISTA, WIN7, WIN8 and WIN10.

Hold down the Windows key  while you press the letter 'r'.

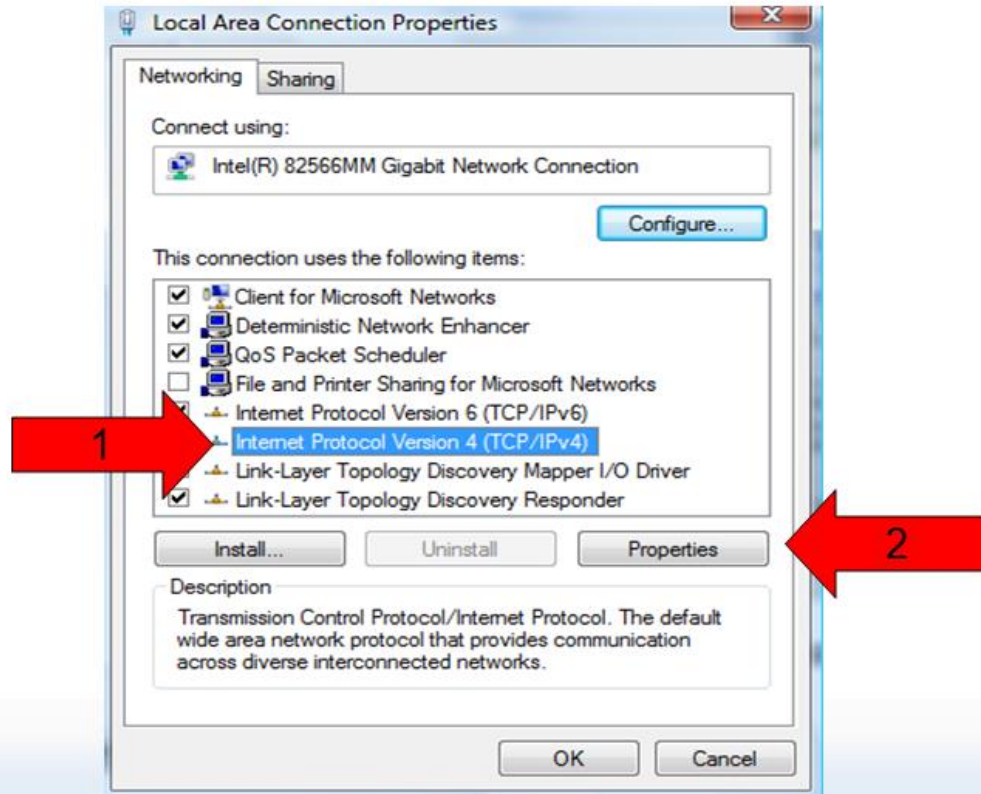
Enter 'ncpa.cpl' in the **Open** box.
Press **OK**.



Double click on **Local Area Connection** and select **Properties**



DCM510 Browser



- (1) Highlight Internet Protocol **Version 4** (TCP/IPv4)
- (2) Select Properties

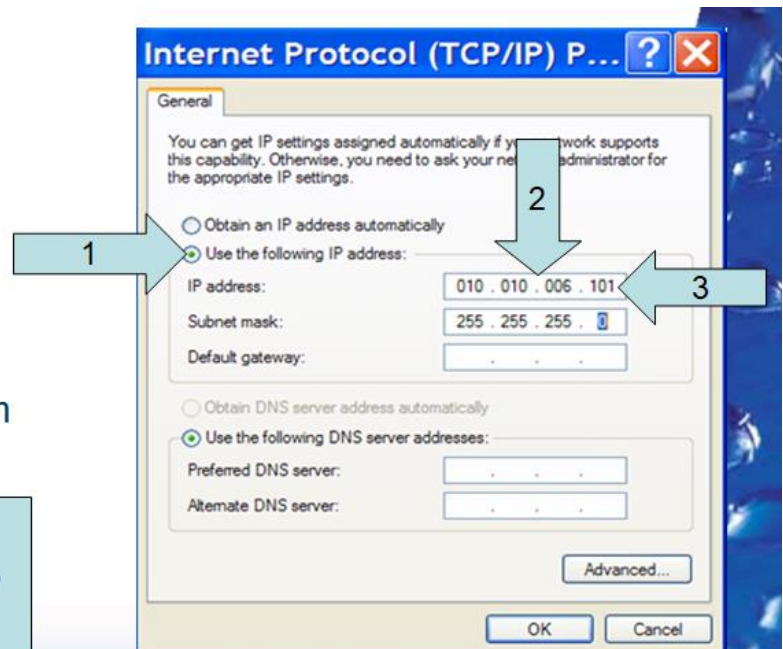
Select the 'Use the following IP address': circle (1)

Enter the first three numbers of the controller's IP address (2)

Example: 010.010.006.____

Then enter a number between 000 and 255 that is different from the controller address

In this example, since the controller IP is 010.010.006.106, we used 010.010.006.101 (3)



Press the Tab key and enter the Subnet mask of 255.255.255.0

Select OK here and on the Local Area Connection window

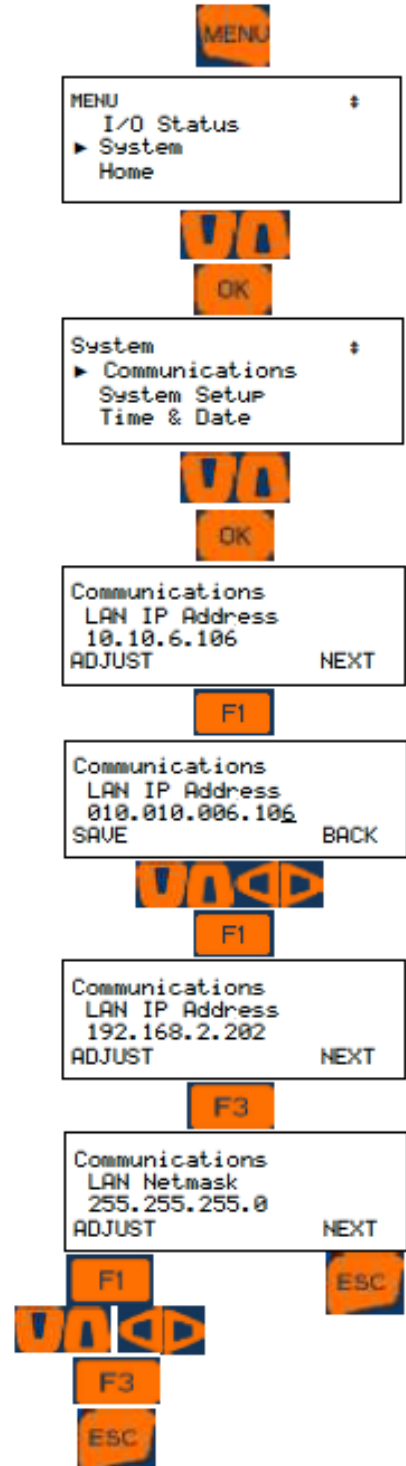
DCM510 Browser

1.2.2 Connecting to the building network

Using the Local Area Network (LAN) port to connect to the building network, you will need to acquire an IP address from the customer which will allow the controller to be compatible with this network. The address you receive must be unique on this network.

Use the keypad to change the address;

- 1 Press Menu
- 2 Scroll up to System. Press OK
- 3 Scroll down to Communications. Press OK
- 4 Scroll down to LAN IP Address. Press F1 Adjust
- 5 Use the up/down and left/right arrows to change the numbers until they show the new address. Press F1 Save.
- 6 If the LAN Netmask is different from the building network, change that as well, then Save.



DCM510 Browser

1.3 The Home Screen 1 of 2

See section 1.4.3 Home Page System Icons.

User Logon and Status. See section 1.4.1 Log-In.

Logout (admin)

Dec-13-2017, 16:23:07
DCM5

DIGITAL IN: 8 On/Off and pulse inputs from flow switches, watermeters and other dry contact signals. (No sinusoidal)

Conductivity
Pool | Spa
0
0 200 1000

Free Chlorine
Pool | Spa
0.59 ppm
0.50 1.75 4.00 5.00

4-20mA Input
Pool | Spa
5.18 mA
3.50 4.50

pH Sensor
Pool | Spa
6.56 pH
7.20 7.45 7.70 8.00

ORP Sensor
Spa
260 mV
400 750 900

Pool Temp
Pool | Spa
84.0 F
70.0 80.0 90.0 100.0

Interlocked R
Oxidant Pump (OFF)

ANALOG: Includes sensor inputs from Potentiometric (mV from pH and ORP sensors for example), Amperometric (all 4-20mA inputs from ProMinent PPM sensors) or any 4-20mA input. Click on the letter icon **F to open the sensor menu.**

Contacts

| Icon | Signal | Status |
|------|----------------|--------------|
| O | Sample Flow | ON :16.41hr |
| R | Spa Flowswitch | OFF:102.6min |

Meters

Turbine meter
0007177 G
Pool | Spa

Water meter
0000000 G
Pool | Spa

mA Outputs

flow rate out 7.20 mA
CAL 20.00%

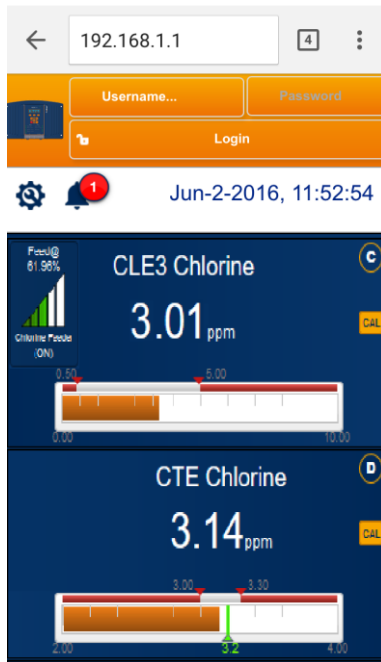
Power Relays

| Relay | Signal | Status |
|-------|---------------|---------------|
| 1 | Acid - Pool | Setpoint |
| 2 | Acid - Spa | Setpoint |
| 3 | Oxidant Pump | Interlocked R |
| 4 | Oxidant - Spa | ON: 35.0min |
| 5 | Alarm Relay | No Event |

OUTPUTS - ANALOG AND DIGITAL: Analog 4-20mA output signals to pumps, chart recorders, etc. Digital relays # 1 to 5 for pump and solenoid control. Digital Relays 6 to 9 as pulse or On/Off output for low voltage pump speed output or On/Off control.

DCM510 Browser

The Home Screen 2 of 2



View from Smartphone.
Scroll in any direction to
access all I/O as shown in
the PC/Tablet screen.

1.4 Home Page Services

From the home page, you can see all the enabled inputs and outputs (I/O). Log-in to gain access to three levels of programming privileges. Operator has the least benefit, while Admin has full access.

1.4.1 Log-In

Once you are connected, log in by selecting a username and enter a password.

Users with Default Passwords:

Operator1 = 1 Operator2 = 2 Operator3 = 3 Operator4 = 4.

Configure5 = 5 Configure6 = 6 Configure7 = 7 Administrator = AAAA

Login Page: Operators can view all controller pages. No access to most System pages.
Configure users can edit the program. No access to most System pages.

Modify Passwords:

If the controller is accessible on the site LAN, you should modify all 8 default passwords.

Two users cannot share the same password because only the password is used to identify keypad users. The controller displays **Password Fail** on a duplicate password.

See section [9.8 User Setup](#) to learn how to change passwords.

DCM510 Browser

1.4.2 Home Page Detail

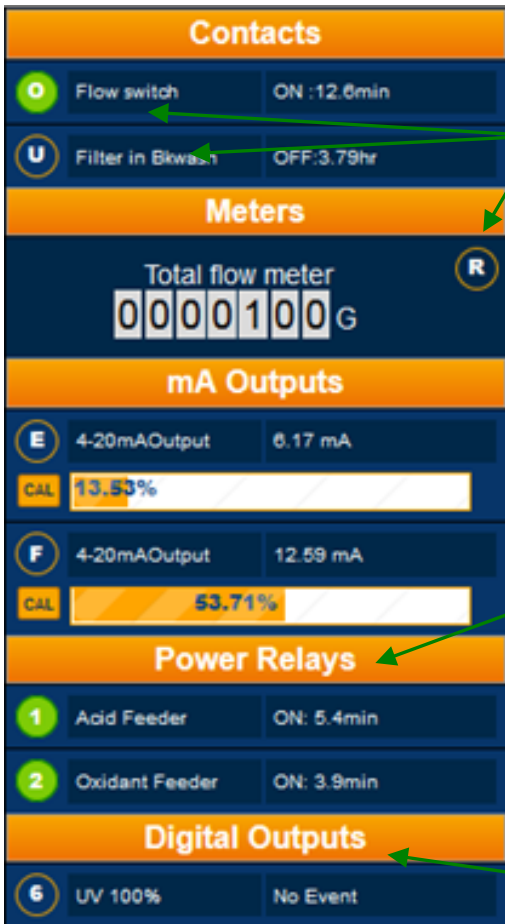
Now that you are logged in, you can edit the controller configuration as well as monitor the action. The following pages break the Home page into sections to enhance identification.

1.4.2.1 Analog Input Display



DCM510 Browser

1.4.2.2 Digital I/O Display



Maximum of 8 Digital inputs, O through V. Can be any combination of dry contact switches or digital flowmeter signals from contact head or paddle wheel models. One is dedicated as a flowswitch per pool.

See section 8 4-20mA Outputs for configuration

Max of 5 Digital (AC Line) Output Relays to power pumps, solenoids and MOV valves.

Digital output configuration covered in sections 2 and 3.


Max of 4 Pulse frequency or On/Off relays.
Rated for 24VDC

DCM510 Browser

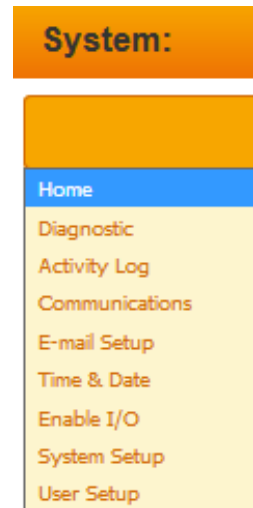
1.4.3 Home Page System Icons


The home page has a variety of services unrelated to the program. These services are accessed via the icons in the upper left corner of the page.




The User Manuals icon  gives you access to the two DCM510 manuals; Operating and Browser (this manual). The Operating manual explains the keypad usage, wiring and specifications. The Browser manual shows you how to connect to and program a DCM510 controller using a PC, tablet or Smartphone.

The System Settings icon  has the following menus:  These menus are explained in sections **9 System Settings**.




The change display icon  allows users with dual systems to select how I/O points are displayed. See section **9.7 System Setup**

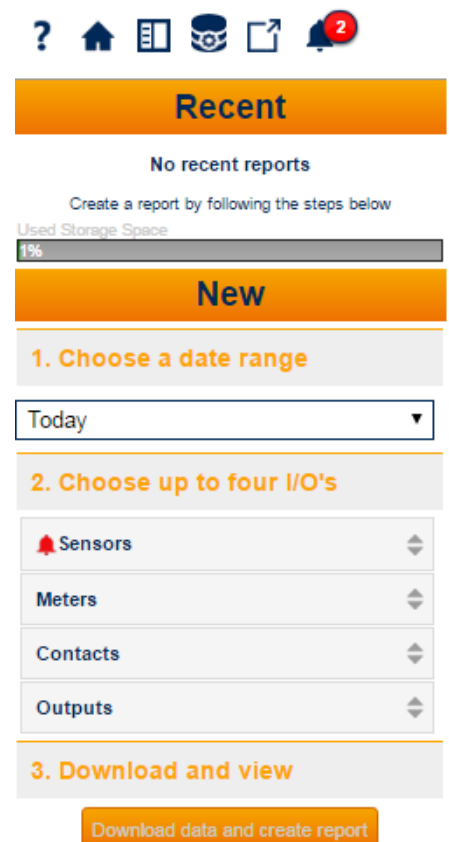
The report icon  opens the report page for trending recent controller history. See section **1.4.4 Create a Report**

Finally, the alarm icon  displays current alarms. Clear them from this menu page.

1.4.4 Create a Report 1 of 3

To create a report, select the report icon  from the main screen. Follow the three steps as shown.

- 1) Choose a date range; Use the down arrow to see preset choices or use manual to create a specific start and end range.
- 2) Choose up to four I/O's; Choose from all enabled inputs and outputs
- 3) Download data and create report; Press this button to create your trend.



DCM510 Browser

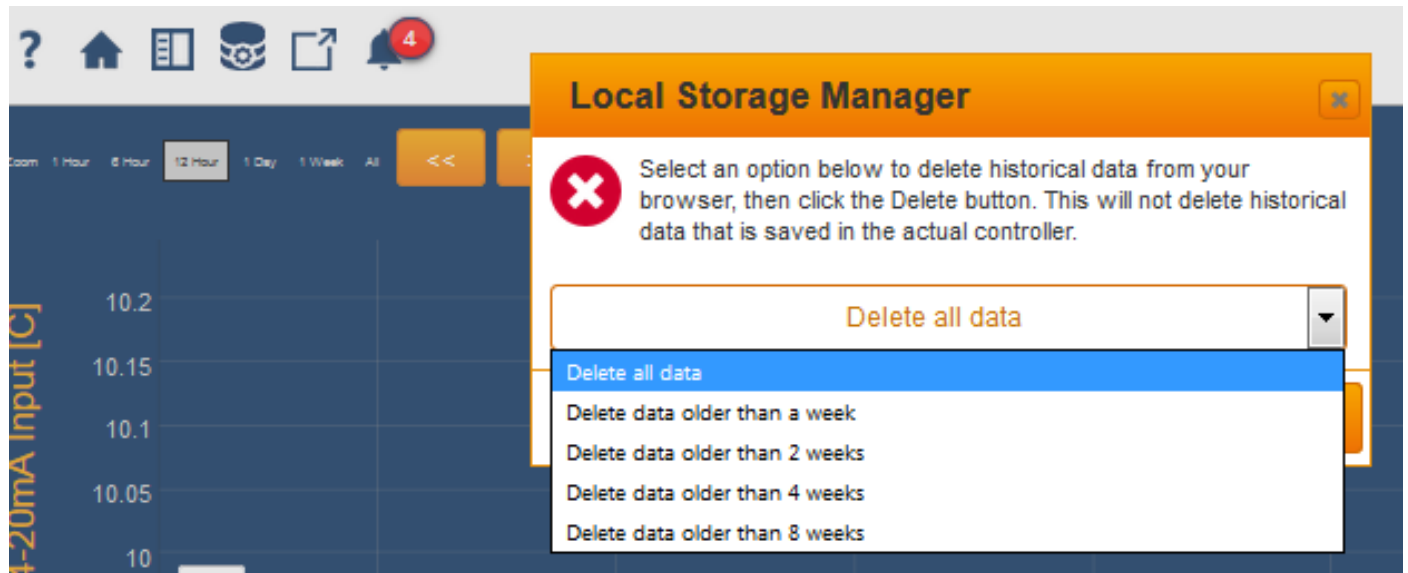
Create a Report 2 of 3

The row of icons at the top of the page have the following functionality;

The Trend page uses a different set of Icons. See explanation below.



- ? Access the controller manuals. Download them to your PC from the controller.
- 🏠 Exit from the report menu back to the Home page
- 📄 Show/hide this report menu
- 🗄️ Manage the report database
- 📄 Show/hide the controller header
- 🔔 Show/acknowledge current alarms



DCM510 Browser

Create a Report 3 of 3



DCM510 Browser

1.5 View & Adjust Setpoints 1 of 2

Select the 1 to 9 icon on the home page. This example adjusts the Relay 1 setpoint

Select **Adjust Setpoint** from the pull-down

Edit Setpoint and Deadband as needed. Press **Submit**

A pump set for Acid feed will turn off at the setpoint and on once the deadband distance is reached. The turn on point is therefore 7.50 in this example.

The output will feed proportionally between the setpoint and deadband when in Time Modulate control mode. Widen these points to reduce or eliminate upsets.

In this example, we submitted a setpoint change. The Status identifies the change and it is added to the activity log

| Status | Setpoint change |
|----------|-----------------|
| Setpoint | 7.50 pH |
| Deadband | 0.05 pH |

Sidebar:

Relays controlled by sensors power Pumps and Solenoids ON and OFF.

(Relays are outputs 1 to 5 & outputs 6 to 9 set to 'ON/OFF')

Frequency controlled Pumps feed chemicals at varying rates.

(Frequency controlled pumps are outputs 6 to 9 set to 'Pulse Output')

ON-OFF Acid pumps use setpoints 0.05 pH apart so that the re-circulation delay between feeding acid and measuring its pH does not cause wide pH swings. If pH swings continue, consider using Special Control programs like Timed Cycling or Time Modulation to delay the controller response to applications that have a long lag time.

DCM510 Browser

View & Adjust Setpoints 2 of 2

The Setpoint page varies with the configuration and type of control output; ON/OFF or variable frequency (pulse).

Select the 1 to 9 icon on the home page.
This example shows the Adjust Setpoint page for relay output #2.

2:Acid Pump

Adjust Setpoint

| | |
|----------|---------|
| Setpoint | 7.45 pH |
| Deadband | 0.05 pH |

Refresh Submit

Feeding based on a sensor requires a **Setpoint** and a **Deadband**. This is the same for all relays 1 to 5 and includes relays 6 through 9 when they are in the ON/OFF mode

Relays utilizing **Special Control Timed Cycling** or **Time Modulation** require the **Setpoint/Deadband** menu.

If **Special Control PID** is used, only the **Setpoint** is required.

7:Free Cl2

Adjust Setpoint

| | |
|-------------|----------|
| PID Control | 5.00 ppm |
|-------------|----------|

Refresh Submit

Sidebar:

Controls may be configured to prevent one chemical feeding while another feeds (See 'Blocking') into a common injection header.

Pumps, feeders, solenoid or valve controls may be turned OFF when the flowswitch shows no sensor header flow
(See Interlocks)

Pay attention to the number 1 to 9 that precedes the pump, valve or solenoid name.
It's the physical location on the controller circuit board of the wiring that connects to the pump, valve or solenoid. This is how the program relates to physical devices.

You may modify the name of the pump, feeder, valve or solenoid but you'll need to know which output is controlling so you can check that controller hood indicating light is ON when the pump, feeder, valve or solenoid is ON. (Relays 1-5 on the Left Hand Side & Pulse 6-9 on the Right Hand Side)

1.6 Priming-Testing Pumps, Feeders & Solenoids

Select the 1 to 9 icon on the home page. This example primes the chlorine pump controlled by Relay 2

Select **Prime-Test** from the pull-down

Time remaining until end of Prime-Test

Select **End of Prime-Test = Yes** to end sooner & **Submit**

Edit the Prime-Test Time, select Yes in the Start box & **Submit**

Refresh to update time or volume remaining

Pulse controls prime on volume, not time

If the control is 'Blocked', 'Stopped', 'Interlocked' or 'Alarmed-OFF', Priming will be prevented.

2:ChlorinePump

Prime-Test

START ☒ Yes ☐ No

Prime, Force ON 5.0 minutes

Force OFF ☐ Yes ☒ No

Refresh Submit

Remaining 00:04:38

End of Prime-Test ☒ Yes ☐ No

Force OFF ☐ Yes ☒ No

Refresh Submit

7:Base

Prime-Test

START ☐ Yes ☒ No

Prime, Force ON 30.0 mL

Force OFF ☐ Yes ☒ No

Refresh Submit

Remaining 23 mL

End of Prime-Test ☐ Yes ☒ No

Force OFF ☐ Yes ☒ No

Refresh Submit

2:ChlorinePump

Prime-Test

Status Interlocked

START ☐ Yes ☒ No

Prime, Force ON 45.0 minutes

Force OFF ☐ Yes ☒ No

Refresh Submit

2:ChlorinePump

Prime-Test

Status User STOPS!

End Force OFF ☐ Yes ☒ No

Refresh Submit

Sidebar:

Priming may also be used to slug feed on system start-up in addition to testing pumps, feeders, valves or solenoids. Run Time Limit alarms (minutes per actuation or volume at maximum strokes per minute) may stop priming. See also Blocks and Interlocks. See also section 8 4-20mA Outputs.

2 Chemical Feed Controls: Oxidant, Acid

2.1 Sensor Controlled Feeds 1 of 2

Select the 1 to 9 icon on the home page. This example uses the **Setup** page for an Oxidant feed controlled by Relay 2

Setting up a sensor controlled feed has 3 steps: **Setup, Configure & Adjust Setpoint**

Select **Setup** from the pull-down

Select **Control Type = Feed**, **Set Feed Mode = Sensor Control** and then select the controlling sensor for **Control by:** from the pull-down & **Submit**

Minimum on time prevents feeder from 'chattering' if setpoints are too close or during special control

2:Oxidant Spa

Setup

| | |
|-----------------|----------------|
| Control Type | Feed |
| Set Feed Mode | Sensor Control |
| Control by: | F:ORP Sensor |
| Minimum ON time | 1 seconds |

Refresh Submit

Edit for your site, up to 16 characters

Inherited from the controlling ORP sensor. Decimal may have up to 3 digits for tighter control.

Control Assist allows the chosen Cl2 sensor to override the ORP setpoints using the Cl2 sensor high and low alarm points for control. pH Lockout can be used to override the ORP and Cl2 setpoints. Choose pH high, low or both.

See the Special Control section

2:Oxidant Spa

Configure

| | |
|-----------------|---|
| Descriptor | Oxidant Spa |
| Decimal digits | 1 |
| Disable | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| Control Assist | C:Free Chlorine |
| pH Lockout | E:pH Sensor |
| Lockout mode | high pH only |
| Special Control | Time Modulate |
| Period | 120 seconds |

Refresh Submit

2:Oxidant Spa

Adjust Setpoint

| | |
|----------|--------|
| Setpoint | 750 mV |
| Deadband | 5 mV |

Refresh Submit

Feeder will start at 745 and stop at 750mV

DCM510 Browser

Sensor Controlled Feeds 2 of 2

7:Acid Feeder

Setup

| | |
|---------------|----------------|
| Control Type | Feed |
| Mode | Pulse Output |
| Set Feed Mode | Sensor Control |
| Control by: | E:pH Sensor |

Refresh

Submit

Frequency outputs do not have a minimum on time setting.

The default Control Action for an acid feeder where feeding decreases pH sensor reading. Can be changed for caustic.

See the Special Control section

Outputs 6 to 9 may be **Mode** configured as either **Pulse Output** or **ON/OFF Output**. Use Pulse for frequency controlled pumps & ON/OFF for Run/Stop controlled pumps.

In this example, we've configured output 7 for frequency controlled feed

Edit for your site, up to 16 characters

7:Acid Feeder

Configure

| | |
|-----------------|--------------------------------|
| Descriptor | Acid Feeder |
| Decimal digits | 2 |
| Disable | <div>Yes</div> <div>✓ No</div> |
| Control Action | ON decreases sensor |
| Special Control | None |

7:Acid Feeder

Adjust Setpoint

| | |
|----------|---------|
| Setpoint | 7.50 pH |
| Deadband | 0.05 pH |

Refresh

Submit

In this example, the pump will turn on at 7.55pH and off at 7.5pH in On/Off mode.

In pulse output mode, the pulses will increase in speed from 0 pulses at 7.5pH to the maximum pulses at 7.55pH

Sidebar:
Sensors controlling 4-20mA outputs are detailed in section 8

DCM510 Browser

2.2 Time Modulation

Time Modulation allows an ON/OFF pump to operate proportionally, similar to a frequency or 4-20mA controlled pump. Properly sized ON-OFF pumps are typically set to maximum stroke and rate in **Time Modulation** mode.

Sidebar:

Time Modulate Special Control is selectable on Relays 1-5 and 6-9 only when they are set to **Mode = ON/OFF Output**.

Time Modulate Special Control proportions the pump on time with respect to the setpoint/deadband. At the beginning of each period, the controller compares the actual sensor value within the setpoint/deadband range and determines how long the relay will be on during that period.

Select the 1 to 9 icon on the home page. This example uses the **Configure** page for an Oxidant feeder controlled by Relay 2

Select **Configure** from the pull-down

2:Oxidant Control

Configure

| | |
|-----------------|---|
| Descriptor | Oxidant Control |
| Decimal digits | 0 |
| Disable | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| Control Assist | C:Free Chlorine |
| pH Lockout | E:pH Sensor |
| Lockout mode | high pH only |
| Special Control | Time Modulate |
| Period | 120 seconds |

Refresh Submit

Control Assist, pH Lockout and Lockout mode are discussed earlier.
See Section 2.1 Sensor Controlled Feeds

Setup a sensor based control as shown in Section 2.1 Sensor Controlled Feeds then change **Special Control** from **None** to **Time Modulate**

In this example, the control range spans 50mV & the **Period = 120** seconds. If the current ORP = 725mV then the pump would be ON for half of the 120 second period. (60 seconds)
 $120 \times (750-725) / (750-700)$ and OFF for the remainder of the period; 60 seconds ($120 - 60 = 60$). As the ORP value approaches the lower range limit ($750-50=700$ mV) the relay will increase the on time. Below 700mV, the relay will remain on for the entire period. As the ORP value reaches the setpoint, (750mV) the relay will feed less chemical. At or above 750mV, the relay will remain off for the entire 120 second period.

3:Oxidant Pump

Adjust Setpoint

| | |
|----------|--------|
| Setpoint | 750 mV |
| Deadband | 50 mV |

Refresh Submit

Note: A typical Deadband would more likely be 10 or 20mV.

Select **Special Control = Time Modulate**
And set the Modulation **Period** in seconds & **Submit**. 60 seconds is typical.

Sidebar:

Widen the difference between the setpoint and deadband to dampen oscillations. A smaller difference will control similar to On/Off control.

DCM510 Browser

2.3 Timed Cycling

Timed Cycling allows time for the controlling sensor to measure the effect of chemical before feeding more chemical. **Timed Cycling** is used where a chemical is fed occasionally into a system with a large volume.

It may be several minutes before the chemical travels from the injection point through the piping and then back to the controlling sensor.

Based on the setpoint, the relay will be on for the ON time in each period and off for the remainder of the period. Once the setpoint is reached, the relay will not turn on again until the setpoint calls for chemical. It is either on for the ON Time each period, or off for the complete period if beyond the setpoint.

Select the 1 to 9 icon on the home page. This example uses the **Configure** page for an Oxidant feeder controlled by Relay 2

Select **Configure** from the pull-down

The Status line appears when needed

Setup a sensor based control as shown in [Section 2.1 Sensor Controlled Feeds](#) then change **Special Control** from **None** to **Timed Cycling**

Control Assist, pH Lockout and Lockout mode are discussed earlier. See [Section 2.1 Sensor Controlled Feeds](#)

In this example, if the oxidant value drops below the setpoint, relay #2 will turn on for 60 seconds and then remain off for (600-60) 540 seconds. This will repeat each Period until the ORP value rises above the setpoint. The controller only compares the value with the setpoint at the start of a cycle. Once a cycle starts, the relay will either be on for the On Time or not come on at all.

1. Select **Special Control** = **Timed Cycling**

2. Set **Period** = OFF + ON Time, maximum 1800 seconds, 30 minutes

3. Set **ON Time** = feed time in any Period & **Submit**

| 2:Oxidant Control | |
|--|---|
| Configure | |
| Status | Reconfigured |
| Descriptor | Oxidant Control |
| Decimal digits | 0 |
| Disable | <input type="radio"/> Yes <input checked="" type="radio"/> No |
| Control Assist | Cl:Free Chlorine |
| pH Lockout | E:pH Sensor |
| Lockout mode | high pH only |
| Special Control | Timed Cycling |
| Period | 600 seconds |
| ON Time | 60 seconds |
| <input type="button" value="Refresh"/> <input type="button" value="Submit"/> | |

Sidebar:

Often there is a long time delay between adding a chemical and measuring its effect at a sensor, which causes setpoint overshoot and poor control. Timed Cycling and Time Modulation are great tools for improving chemistry control.

2.4 PID Controls (Relays 6 through 9 only)

If long delays (>60 seconds) exist in your control loop, or you are not experienced in PID control with long delays, we advise that you use a different proportional control method like Time Modulation or Timed Cycling. See **Special Control. (Sections 2.2 and 2.3)**

Select the 6 to 9 icon on the home page. This example uses the **Configure** page for an Oxidant feeder controlled by Relay 7 in pulse mode

Select **Configure** from the pull-down

Setup a sensor based control as shown in **Section 2.1 Sensor Controlled Feeds** then change **Special Control** from **None** to **PID**

7:Oxidant Feeder

Configure

| | |
|-----------------|---|
| Status | Reconfigured |
| Descriptor | Oxidant Feeder |
| Decimal digits | 0 |
| Disable | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |
| Control Assist | D:Total Chlorine |
| pH Lockout | E:pH Sensor |
| Lockout mode | high pH only |
| Special Control | PID Control |
| Pump Type | Other |
| mL/stroke | 0.100 |
| Other Pump | 240 Rated SPM |
| Xp Proportnl | 100.000 |
| Integral Rate | 300 seconds |
| Diffnce Rate | 0 seconds |

Refresh
Submit

7:Oxidant Feeder

Adjust Setpoint

PID Control
740 mV

Refresh
Submit

PID Control only requires a single **Setpoint** with no **Deadband**

This example uses a variable frequency control pulse pump. The relay ON time is modulated by the PID control.

Control Assist, pH Lockout and Lockout mode are discussed earlier.
See Section 2.1 **Sensor Controlled Feeds**

Select **Special Control = PID Control**

When tuning or troubleshooting, never change two or more parameters at the same time. This includes the pump output.

Proportional is the range of control. 100.0mV (in this example) from the setpoint, the output will be at 100% on and proportionally diminish until at the setpoint, where the output will be off.

The Integral rate controls how frequently the output responds to the process and setpoint difference. A larger value will have less effect. 300 seconds means that the controller will update the response every 5 minutes. Zero is off.
Rule of thumb; set equal to 1.5x or 2x lag time.

Lag Time: The time needed for the sensor to reflect the full effect of an increase in chemical feed.

The difference rate fine tunes the Integral. Set for 0 and if the output has an oscillation that cannot be stopped using P and I, start to increase D slowly. A little goes a long way. 99% of customers will not need this parameter. (Zero is off)

2.5 Control During Events

3:Oxidant Pump

Setup

| | |
|-----------------|-----------------|
| Control Type | Feed |
| Set Feed Mode | Sensor Control |
| Control by: | C:Free Chlorine |
| Minimum ON time | 1 seconds |

Refresh

Feed **Events** are set as detailed in the following Section 4.0 **Events: Feeding by Time & Date**

Select the 1 to 9 icon on the home page. This example uses the **Setup** page for an Oxidant feed controlled by Relay 3

Select **Setup** from the pull-down

Events only exist on the pull down if the **Control Type = Feed or Events**. This example shows **Sensor Control** & the control is an oxidant, Chlorine in this example

3:Oxidant Pump

Adjust Setpoint

| | |
|----------|-----------------|
| Status | Setpoint change |
| Setpoint | 3.00 ppm |
| Deadband | 0.10 ppm |

Adjust **Setpoint** controls the Relay 3 Oxidant Feed using these setpoints until an **Event** occurs. During an event, the alternate setpoint/deadband values are used. See below, right.

This drop down will display all currently configured events

During an **Event**, if **Event Control = No** There is no change to the setpoint and deadband values.

During an **Event**, if **Event Control = Yes** these setpoints control the pump. The original setpoints are ignored during the event.

2:Oxidant Control

Events

| | |
|-----------------|-----------------|
| Status | Events Added |
| Day 2 | 2 Events weekly |
| Event Cycle | Weekly |
| Select Activity | Edit an Event |

Select for Edit & Delete

Day 2 @ 11:45 for 12 minutes

Day 2 @ 11:45 for 12 minutes

Day 2 @ 11:45 for 12 minutes

Values for Add & Edit

| | |
|-----------------|---|
| Start Day | 2 1-7 |
| Start Time | 11:45 |
| ON Time | 12 minutes |
| Event frequency | Once Alternate Days Daily |
| Event Control | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| Setpoint | 5.00 ppm |
| Deadband | 0.10 ppm |

Reset Submit

DCM510 Browser

2.6 Limiting Feed & Alarms

Run Time Limits are used detect and alert operators of problems with chemical feeders.

Select the 1 to 9 icon on the home page. This example shows the **Alarms** page for an Acid feed controlled by relay output #1

Select **Alarms** from the pull-down

If your not concerned about extended feed periods, set for greater than 1440, so **Mins/Actuation** will never trip, or set **Disable Alarms** = Yes.

Off on Alarm means the output will turn off if alarmed. Relay alarms are latched and do not reset without Operator intervention to clear the alarm and determine if other action is required. See Sidebar

When **Alarm Relay** = Yes, the alarm relay will be activated whenever this relay is in the alarmed state. Any relay can be set up as an Alarm Relay. Use the Configure menu/Special Control tab of the relay you wish to make an Alarm relay.

Clear Alarm = Yes will clear this alarm and reset the **Mins/Actuation** timer.
Disable Alarms will turn off the alarm function for this relay

Most recent alarm & it's type, if any. This one is months old so we're not frequently alarming

| 1:Acid Pump | |
|--|---|
| Alarms | |
| Mins/Actuation | 1500.0 minutes |
| OFF on Alarm | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| Alarm Relay | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| Clear Alarm | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| Disable Alarms | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| User STOPS! | 14:51 2017-Aug-31 |
| <input type="button" value="Refresh"/> <input type="button" value="Submit"/> | |

Sidebar:

If you are experiencing limit alarms, what has changed? Are you out of chemical? Was there a change in demand for chemical? Is the sensor working/calibrated? Is the chemical injector clogged?

DCM510 Browser

2.7 Interlocks - No Feed on No Flow

An Interlock is a dry contact digital input to the controller (O through V) that can be used to indicate the status of other equipment. This status can then be used to start or stop output relays and/or 4-20mA signals.

Select the 1 to 9 icon on the home page. Any digital input, O through Z, can be an Interlock. Interlocks stop relays from energizing. When the Interlock is on, (input closed), the relay is enabled.

1:Acid Pump

Interlocked

| | |
|--------------------|-----------|
| O:Sample Flow | Interlock |
| S:Return Line Flow | unused |

Refresh

Submit

Select **Interlocked** from the pull-down

In this example, when the contact set @ input 'O: Sample Flow' is **ON** then the relay 1 Is enabled to turn on. It will feed based on the pH setpoint

In this example relay output 4 controls a chlorine pump.

If both **Sample Flow** (O) and **Return Line Flow** (S) are **ON**, we want the chlorine to be enabled, so we select both to **Interlock** & '**AND**' them. 'OR' would mean that if either interlock is on, the output would be enabled. OR's are rarely used in Aquatic applications as that tends to be an unsafe condition.

4:Chlorine pump

Interlocked

| Status | Interlock edit |
|--------------------|----------------|
| O:Sample Flow | Interlock |
| S:Return Line Flow | Interlock |
| Contact set | 'AND'ed |

Refresh

DCM510_Browser.doc

30

2.8 Blocking-Delaying a Feed

Interlocks are inputs that can pause outputs. Blocks are outputs that can pause other outputs.

Select the 1 to 9 icon on the home page.
This example uses the **Blocked by** page for a chlorine feed controlled by relay output 4

4:Oxidant - Spa

Blocked by

| | |
|---------------|--------|
| 1:Acid - Pool | Blocks |
| 2:Acid - Spa | unused |
| 3:Backwash | unused |
| 5:Alarm Relay | unused |

Refresh

Submit

Select **Blocked by** from the pull-down

In this example, the Acid relay # 1 **Blocks** the **Chlorine Feed** on Relay 4 to prevent both pumps from feeding at the same time. When the acid relay turn off, the pause is lifted from relay 4 and it returns to the control program.

More than one block may be selected

Sidebar:

Warning: A poorly conceived block may prevent a control from maintaining setpoint.

2.9 Feed Diagnostics 1 of 2

Select the 1 to 9 icon on the home page.
This example shows the **Diagnostic** page for an **Acid Pump** controlled by relay 7 as an **On/Off** output

Select the I/O icon on the home page then select **Diagnostic** from the pull-down

Diagnostic provides both configuration & status on one page

Control state

Location of controlling sensor, 'F' & current value.

Current **Setpoint** and **Deadband**

This is an example the **Diagnostic** page for an **Acid Pump** controlled by relay 6 as a **frequency** output

If Time Modulation is used, this box appears with ON/OFF status

The information is added for frequency pumps in the pulse output mode.

7:Acid Pump

Diagnostic

| | |
|----------------|-----------------|
| Status | Operational, ON |
| Feed by: .F. | 7.51 pH |
| Setpoint | 7.45 pH |
| Deadband | 0.05 pH |
| Control Action | Feed Acid |

0.2m ON today0.2m ON, actuation

Feed state

Refresh

6:Acid Pump

Diagnostic

| | |
|----------------|-----------|
| Status | ON |
| Feed by: E | 7.49 pH |
| Setpoint | 7.45 pH |
| Deadband | 0.05 pH |
| Control Action | Feed Acid |

Volume today3.584G

Owes2.20mL

Timed Cycling Period:40ON Countdown: 45 seconds

Refresh

DCM510 Browser

Feed Diagnostics 2 of 2

This page shows examples of Diagnostic information for relays.

An Event diagnostic allows you to terminate an active event. This does not change the schedule.

1:Events

Diagnostic

| | |
|---------------|--------------------------------|
| Status | ON |
| End Event? | <div>Yes</div> <div>✓ No</div> |
| 1.1m ON today | 1.1m ON, actuation |
| Time Owed | 10.9 min |

Refresh

Submit

If an Oxidant relay is set up for pH override, the status will alert an override action

4:Chlorine pump

Diagnostic

| | |
|--------------------------|---------------------------|
| Status | pH override, OFF |
| 3.6m ON today | 0.0m ON, actuation |
| ~~~~~ | |
| Time Modulate Period:120 | OFF Countdown: 28 seconds |

Refresh

DCM510 Browser

3 Events: Feeding by Time & Date

3.1 Setting & Viewing Events 1 of 2

Select the 1 to 9 icon on the home page.
This example uses relays 5 & 6. Relay 5 is an example of all relays in On/Off mode. Relay 6 is in frequency mode.

5:Event Relay

Setup

Control Type: Events-Other

Mode: Pulse Output

Refresh Submit

Select Control Type = Events-Other & Submit from the setup page

The frequency/pulse option is only available on relays 6 - 9

6:Acid Pump

Setup

Control Type: Events-Other

Mode: Pulse Output

Refresh Submit

6:Acid Pump

Events

| Status | Events Added |
|--------|-----------------|
| Day 4 | 1 Events weekly |

Event Cycle: Weekly

Select Activity: Edit an Event

Select for Edit & Delete

Day# in the current 28 day cycle.
Wednesday, **Day 4** in this example
May be reset to the current Sunday,
See Section 9.7 System Setup

Daily, Weekly & 28 Day programs can be mixed in one controller.

See also, section 2.5 Control During Events

Events repeat **Daily, Weekly** or every **28 Days**
Select the required **Event Cycle**.

Select Activity = Add an Event

In this example, the first event occurs on Monday, day 2 starting @ 4:00 AM & feeding for 120 minutes

A frequency output relay in pulse mode will be set in terms of volume, not time

Day 1 Start 04:00 for 120 mL

Value: 1 1-7

Start Day: 1

Start Time: 4:00

Volume: 120 mL

Event frequency: Once, Alternate Days, Daily

Reset Submit

In this example, we're also adding feed events on Wednesday, Friday & Sunday by selecting **Alternate Days** & Submit

Sidebar: Relay 1-5 and controls 6-9 in the ON-OFF mode have timed events. The pump starts at a particular time and runs for a certain number of minutes. Pulse-frequency controls 6-9 have volume feed events. The feed is based on a volume

Setting & Viewing Events 2 of 2

5:Event Relay

Events

| | |
|-------------------------------|---------------------------------|
| Status | Events Added |
| Day 4 | 4 Events weekly |
| Event Cycle | Weekly |
| Select Activity | Edit an Event |
| Select for Edit & Delete | |
| Day 2 @ 04:00 for 120 minutes | |
| Values for Add & Edit | |
| Start Day | 2 1-7 |
| Start Time | 4:00 |
| ON Time | 120 minutes |
| Event frequency | Once Alternate Days Daily |

Reset

Submit

In the previous page's example, 4 feed events on Monday, Wednesday, Friday & Sunday were added on **Submit**

Select Activity to
Edit an Event
Delete an Event
Delete All Events
Or
Add an Event (see previous page)

Pull down this selector to view all of the events for this control & to select an event for Editing or Deleting

If Select Activity = Edit an Event or Add an Event the values in these fields are set on **Submit**.
The Start Day will remind you of the cycle type; 1-7 is a weekly cycle. The 2 in this example is the choice made for the day of the cycle. Sunday is day 1, Monday is 2, etc.

Sidebar:

Limit Alarms, Interlocking & Blocking also are used with Events. They are set identically to those for **Chemical Feed Controls**. Refer to Sections 3.5 to 3.7 for setup & state pages.

Timed & Volume events can also be used to wash sensors, activate solenoids, block other controls during event times or activate alternate chemical or energy saver setpoints.

DCM510 Browser

3.2 Alarm Relay

Any relay can be configured as an alarm output relay. Once a relay is designated as the alarm relay, all other I/O points have the choice to activate the alarm relay when they themselves are in alarm. They can choose to activate the alarm relay or not. Any System alarm will activate the alarm relay.

5:Alarm Relay ← Select the control # icon from the right side of the home page

Setup ↓ Select the Setup menu from the pulldown

Control Type: **Events-Other** ← Verify Control Type is Events-Other

Refresh Submit

5:Alarm Relay ← Select the Configure menu from the pulldown

Configure ↓

Descriptor: **Alarm Relay**

Disable: Yes ☐ No ☒

Special Control: **Alarm Output** ← Set Special Control = Alarm Output & Submit

Refresh Submit

7:Acid Pump

Alarms ↓

vol.@ MAX spm: **3.8 G**

OFF on Alarm: ☒ Yes ☐ No

Alarm Relay: ☒ Yes ☐ No ← When this acid pump on relay 7 is in alarm, the Alarm Relay will be activated

C:CLE3 Chlorine

Alarms ↓

Status: **Ala**

HiAlarm: **5.00 ppm**

LoAlarm: **0.50 ppm** ← When this CLE3 sensor is in alarm, the Alarm Relay will not be affected.

Alarm Relay: ☐ Yes ☒ No

Delay on Alarm: **5.0 minutes**

Sidebar:

Use an alarm relay to turn on an Alarm Light or Klaxon horn. Use relays 6 – 9 to send an alarm signal to a control system.

Relays 6 through 9 can be used with a maximum of 24VDC/250mA power. Wire them in either direction. They are not polarity sensitive. They can only be configured in ON/OFF mode.

DCM510 Browser

4 Sensors: Amperometric, pH, ORP, Corrosion, Conductivity

4.1 Sensor Setup 1 of 2

Select the **A to N** icon on the home page .
This example shows a pH sensor connected to input 'E'

Select **Setup** from the pulldown

Edit **Descriptor** to site name for browser & local HMIs.
Maximum 16 characters

Edit Units, defaults to typical for sensor type
Maximum 3 characters

of digits after decimal. Defaults to typical for sensor type
pH = 2, conductivity and ORP = 0

Select 1 or 2 point calibration

Submit to save modifications

Used by I/O blocks the **Disable** option & indicates where the sensor is used.
Relays 1, 4, 7 & as compensation for sensor C, Free Chlorine

| E:pH Sensor | |
|--|-----------|
| Setup | |
| Descriptor | pH Sensor |
| Display Units(UOM) | pH |
| Decimal digits | 2 |
| Calibrate | 2 Point |
| Used by I/O | 1,7,4,C, |
| <input type="button" value="Reset"/> <input type="button" value="Submit"/> | |

From the configure page, you can select a compensation. This is not available on the ORP sensors

For this example, we show how pH can be chosen to compensate Free Cl2

| C:Free Chlorine | |
|--|--------------|
| Configure | |
| Compensation | pH Corrected |
| pH Sensor | E:pH Sensor |
| <input type="button" value="Reset"/> <input type="button" value="Submit"/> | |

Sidebar:

Disabled sensors do not appear on either the local or browser HMIs or any pull-down option. Sensors cannot be disabled while in use for control, interlock or compensation. Disabled sensors can be re-enabled on the **System / Enable I/O** page of the Home screen.

DCM510 Browser

Sensor Setup 2 of 2

G:4-20mA Input

Setup

| | |
|--------------------|---|
| Descriptor | 4-20mA Input |
| Display Units(UOM) | C |
| Decimal digits | 2 |
| Calibrate | 2 Point |
| Disable | <div>Yes</div> <div>✓</div> <div>No</div> |
| Sensor Type | Other |
| 20mA Value | 100.00 C |
| 4mA Value | 0.00 C |

Reset

Submit

4-20mA inputs @ 'G' and on dual 4-20mA input driver cards can select **Sensor Type = Other** to install sensor type not shown in the **Sensor Type** pull down

Sensor Type = Other may set a user defined loop span for the sensor & **Submit**

C:CLE3 Chlorine

Setup

| | |
|--------------------|---|
| Descriptor | CLE3 Chlorine |
| Display Units(UOM) | ppm |
| Decimal digits | 2 |
| Disable | <div>Yes</div> <div>✓</div> <div>No</div> |
| Sensor Type | CLE3 Chlorine |
| Sensor Range | CLE3 0-10ppm |

Reset

Submit

Defined **Sensor Types** may have more than one available **Sensor Range**. Select **Sensor Type** & **Submit**
Then Select **Sensor Range** & **Submit**

Sidebar:

Selecting a **Sensor Type** installs the correct 4-20 mA to sensor value conversion & sets calibration limits.

DCM510 Browser

4.2 Sensor Compensation

C:Free Chlorine

Select **Configure** from the pulldown to select-view **Compensation**.
Not all sensor types have **Compensation**

Free Chlorine sensors are typically compensated with pH.

Select **Compensation** = **pH Corrected** & **Submit**.
Then select **pH Sensor** = target sensor & **Submit**.

If you wish to enter a fixed pH value, select **None** and submit, then enter the pH value.

Configure

Compensation: **pH Corrected**

pH Sensor: **E:pH Sensor**

Reset Submit

I:Conductivity

Conductivity is always thermally compensated.
Select **Compensation** = **Thermal Comp.** & **Submit**.
Then select **Thermal Sensor** = target sensor & **Submit**

This **Compensation** value is typical for a ProMinent sensors,
your application may differ

Configure

Compensation: **Thermal Comp.**

Thermal Sensor: **K:Temperature**

Compensation: **0.970 %/F**

Reset Submit

E:pH Sensor

Temperature compensation is available for pH sensors,
though rarely used in Aquatics applications.

Select **Compensation** = **Thermal Comp.** & **Submit**.
Then select **Thermal Sensor** = target sensor & **Submit**.

Configure

Compensation: **Thermal Comp.**

Thermal Sensor: **M:Pool Temp**

Reset Submit

Sidebar:

If you are re-purposing a controller or adding additional sensors & controls then you may be changing-modifying the default compensation.

DCM510 Browser

4.3 Sensor Calibration

4.3.1 DPD: Oxidant Sensors

C:Free Chlorine

Calibrate

Take DPD Sample & press 'Start'

Factory Reset ☐ Yes ☒ No

Submit Start

Select the **A** to **N** icon on the home page or the **CAL** icon below the A-N icons. This example calibrates chlorine sensor connected to 4-20mA input C

If using the **A** to **N** icon, select **Calibrate** from the pulldown

Grab sample from the sensor installation header & press **Start**

Start saves the current value of the sensor for use when you complete the DPD test.

C:Free Chlorine

Calibrate

Sensor Monitor Elapsed

2.2 ppm 01:05

Free Chlorine 2.4ppm

Calibrate

Use the onboard timer for your DPD test

When you have the result of the DPD test, edit the displayed value & press **Calibrate**

C:Free Chlorine

Calibrate

Status Calibrated

Take DPD Sample & press 'Start'

Factory Reset ☐ Yes ☒ No

Submit Start

Calibrate shows 'Calibrated' on success. Close window to exit

Factory Reset = Yes & Submit restores the 4-20mA-to-ppm conversion to its factory default

Calib. Override ☐ Yes ☒ No

if you get a calibration error message you can ignore it by **Calib. Override = Yes & Submit** or re-calibrate by selecting **Start**

Sidebar: Amperometric Sensors

The DPD calibration applies to CLO, CTE, CGE & CLE3 Chlorine & CBR Bromine sensors. All of these sensors connect to 4-20mA input driver cards. The G input does not have the necessary voltage to power a loop for the ProMinent amperometric sensors.

DCM510 Browser

4.3.2 pH Dual Buffer Calibration 1 of 2

Select the **A** to **N** icon on the home page or the **CAL** icon below the A-N icons.
This example calibrates the pH sensor connected to input E

E:pH Sensor

Setup

| | |
|--------------------|----------------|
| Descriptor | pH Sensor |
| Display Units(UOM) | pH |
| Decimal digits | 2 |
| Calibrate | 2 Point |
| Used by I/O | L ₁ |

Reset Submit

If using the **A** to **N** icon, select **Setup** from the pulldown to verify **2 Point**

pH sensor calibration defaults to single point.
To do a 2 buffer pH calibration select **Calibrate = 2 Point & Submit**.
Then select **Calibrate** from the pull down

Caution: Sensor Removal
Always close the sensor piping upstream valve first.
pH, ORP sensors & sensor with membranes may fail on the high transient pressure caused by quickly closing the downstream valve first.

Remove the pH sensor & place in the 1st buffer.
Calibration defaults to 7 & 10 buffers.
If you are not using a 7 buffer, edit the buffer value before **Start**.

The selected 1st buffer in this example is the default **7.00**

E:pH Sensor

Calibrate

| | |
|---------------|---|
| 1st pH buffer | 7.00 pH |
| Factory Reset | <input type="button" value="Yes"/> <input checked="" type="button" value="No"/> |

Submit Start

Start locks the pH value for control and alarms during the 2 buffer clibrate sequence

E:pH Sensor

Calibrate

| | |
|----------------|---|
| Sensor Monitor | Elapsed |
| 7.06 pH | 00:52 |
| 7.0 Buffer | 7.00 pH |
| Factory Reset | <input type="button" value="Yes"/> <input checked="" type="button" value="No"/> |

Next

Wait until the sensor reading settles then press next

DCM510 Browser

pH Dual Buffer Calibration 2 of 2

E:pH Sensor

Calibrate

7.0 Buffer 7.05 pH

2nd pH buffer 10.00 pH

Next Cancel

Results from 1st buffer

If you are not using a 10 buffer, edit the buffer value before pressing **Next**.

Select **Cancel** to exit **Calibration** without saving changes.

E:pH Sensor

Calibrate

7.0 Buffer 7.05 pH

10.0 Buffer 9.61 pH 25sec

Factory Reset Yes ☒ No

Calibrate Refresh Cancel

Refresh until the pH is stable & close to the 2nd buffer value. Then press **Calibrate**.

E:pH Sensor

Calibrate

Status Calibrated

1st pH buffer 7.00 pH

Factory Reset Yes ☒ No

Start Cancel Submit

Successful calibration. Press **Cancel** to exit **Calibration**.

On error message, select **Calib. Override = Yes & Submit**
Or
Re-calibrate to do over
Or
Cancel to exit leaving the current pH value unchanged

E:pH Sensor

Calibrate

Status Out of Range

7.0 Buffer 7.05 pH

Sensor 10.00 pH

Calib. Override Yes ☒ No

Factory Reset ☒ Yes No

Cancel Re-Calibrate Submit

Note: Two buffer pH calibration seldom results in better pH control than single point, however, it is great for proving that the probe still has movement/range!

DCM510 Browser

4.3.3 4-20mA Input Loop Calibration 1 of 3

4-20mA inputs may be single or two-point calibrated. This is an example of a single point calibration.

(This example does not include ProMinent amperometric sensors.)

Select the **A to N** icon on the home page or the **CAL** icon below the A-N icons.
This example calibrates the 4-20mA Mag-meter connected to input G

G:Mag Meter

Setup

Descriptor: Mag Meter

Display Units(UOM): GPM

Decimal digits: 0

Calibrate: 1 Point

Disable: ☐ Yes ☒ No

Sensor Type: Other

20mA Value: 240 GPM

4mA Value: 0 GPM

Reset Submit

If using the **A to N** icon, select **Setup** from the pulldown & check **Calibrate = 1 Point**

Fill in as desired

Select 1 or 2 point calibration

In this example we're going to single point **Calibrate a Sensor Type = Other**

G:Mag Meter

Calibrate

Enter value: 240 GPM

Factory Reset: ☐ Yes ☒ No

Submit Calibrate

Edit the sensor value & press **Calibrate**

G:Mag Meter

Calibrate

Status: Calibrated

Enter value: 245 GPM

Factory Reset: ☐ Yes ☒ No

Submit Calibrate

Status = **Calibrated** & displays new value

DCM510 Browser

4-20mA Input Loop Calibration 2 of 3

On this page we are 2 point calibrating a 4-20mA temperature sensor.
Verify the **Setup** page **Calibrate = 2 Point** & select **Calibrate** from the pull down.

G: Temperature

Setup

| | |
|--------------------|---|
| Descriptor | Temperature |
| Display Units(UOM) | C |
| Decimal digits | 1 |
| Calibrate | 2 Point |
| Disable | <input type="radio"/> Yes <input checked="" type="radio"/> No |
| Sensor Type | Temperature |
| Current Loop | Temp. 0-100C |

Reset Submit

Open the Temperature input by selecting the icon on the Home page. Select Setup from the pulldown. Select '2 Point' from the Calibrate box and 'Temperature' from the Sensor Type box. If your scale differs from the one offered, change 'Temperature' to 'Other' and set your scale manually.

Select the Calibrate menu from the dropdown. Place the sensor into a known temperature bath and enter the value here. Press Start

G: Temperature

Calibrate

| | |
|-----------------|---|
| Sensor Monitor | Elapsed |
| Enter 1st value | 80.0 C |
| Factory Reset | <input type="radio"/> Yes <input checked="" type="radio"/> No |

Submit Start

G: Temperature

Calibrate

| | |
|-----------------|---|
| Sensor Monitor | Elapsed |
| First value | 80.0 C |
| Enter 2nd value | 32.0 C |
| Factory Reset | <input type="radio"/> Yes <input checked="" type="radio"/> No |

Calibrate

Enter a value to a second known temperature and enter the value here. Press Calibrate.

Factory Reset will cancel this calibration and re-enter the base calibration calculated from the setup page

G: Temperature

Calibrate

| | |
|-----------------|---|
| Status | Calibrated |
| Enter 1st value | 32.0 C |
| Factory Reset | <input type="radio"/> Yes <input checked="" type="radio"/> No |

Submit Start

Status = Calibrated & displays most recent value

Sensor type = Other
Always calibrates.
Understandably, we cannot know the calibration limits for 'Other' sensors

DCM510 Browser

4-20mA Input Loop Calibration 3 of 3

Use this method if you cannot induce the sensor to output known values. (If you do not know how much water is flowing through a watermeter, you cannot calibrate!)

You'll need either a current loop emulator connected to input 'K' (in this example) or the means to switch the current loop to 4mA & then to 20mA

1 Once the input is connected and set at 4.0mA, enable the input and open the Setup page

2 Select **2 Point** calibration and choose 'Other' for **Sensor Type**. Press Submit

3 Select **Calibrate** from the dropdown menu. Select **Calibrate 4-20mA**. Press **Start**

4 See the mA measured value. Should be 4.0 mA. Press **Next**.

5 Adjust the mA input to 20mA on your emulator/meter. Wait a minimum of 10 seconds. Press **Calibrate**.

6 Note the **Status**. Should say **Calibrated**.

7 Enter the maximum and minimum range for the 20 and 4mA values. The calibration is complete. Test the input: enter 20mA, the display should read the maximum value. Enter 4mA: you should see the minimum value. (240 and 0 in this example)

The screenshots show the following steps:

- Setup Page:** The 'Calibrate' dropdown is set to '2 Point' and 'Sensor Type' is 'Other'. The '20mA Value' is 20.00 mA and the '4mA Value' is 4.00 mA. The 'Submit' button is pressed.
- Calibration Page:** The 'Calibrate' dropdown is set to 'Calibrate 4-20mA'. The 'Start' button is pressed.
- Connect 4mA test:** The 'Connect 4mA test' field shows '4.01 mA measured'. The 'Next' button is pressed.
- Connect 20mA test:** The 'Connect 20mA test' field shows '20.01 mA measured'. The 'Calibrate' button is pressed.
- Status:** The 'Status' field shows 'Calibrated'.
- Final Setup:** The '20mA Value' is set to '240.0 GPM' and the '4mA Value' is set to '0 GPM'. The 'Submit' button is pressed.

DCM510 Browser

4.3.4 Inventory Calibration

K:Cl2 Inventory

Setup

| | |
|--------------------|---|
| Descriptor | Cl2 Inventory |
| Display Units(UOM) | G |
| Decimal digits | 0 |
| Disable | <input type="button" value="Yes"/> <input checked="" type="button" value="No"/> |

Inventory subtracts the volume pumped by pulse controls and/or the volume measured by displacement metering on the pump head from the user set volume

In this example, the volume pumped by pulse control '6' lowers the tank level

K:Cl2 Inventory

Calibrate

| | |
|----------------|---|
| Sensor Monitor | Elapsed |
| Enter value | 100.0 G |
| Factory Reset | <input type="button" value="Yes"/> <input checked="" type="button" value="No"/> |

Phantom inputs do not physically exist; you can't wire to them. They are of two types: Analog values in the 'K' to 'N' space & Digital values; volumes and contact sets in the 'W' to 'Z' space. This example, uses 'K' as a tank level **without a tank level sensor**. The inventory level is a calculation based on the amount of chemical fed.

Input 'K' has **Compensation** set to **Inventory**

Phantoms are logged, alarmed & can be used for controls. In this example, likely only a low tank level alarm is used

When the tank is refilled, edit **Enter Value** & press submit to set the current tank level

K:Inventory

Configure

| | |
|-----------------|---------------|
| Compensation | Inventory |
| O:MU Meter | unused |
| P:Bleed Meter | unused |
| R:Turbine meter | unused |
| U:Water meter | unused |
| 6:Oxidant Pump | Target Output |
| 7:PPM Test | unused |
| 8:P8 PID | unused |

DCM510 Browser

4.4 Sensor Alarms

Select the **A to N** icon on the home page .
This example is a pH sensor connected to input E

Select **Alarms** from the pulldown

| E:pH Sensor | |
|--|---|
| Alarms | |
| HiAlarm | 7.70 pH |
| LoAlarm | 7.20 pH |
| Alarm Relay | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| Delay on Alarm | 5.0 minutes |
| Disable Alarms | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| Non Latching | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| Slider Max. | 8.00 pH |
| Slider Min. | 7.00 pH |
| <input type="button" value="Reset"/> <input type="button" value="Submit"/> | |

If using for control, set the **HiAlarm** to trap a fault.
In this example a failure to feed acid or perhaps a leaky feed line

If using for control, set the **LoAlarm** to trap a fault.
In this example a pump that overfed or was left in manual.

If you have configured an Alarm Relay, you can choose to activate that relay based on this sensor.

Use **Delay on Alarm** to block momentarily exceed alarm limits

With **Disable Alarms** = **Yes** this sensor will never alarm.

Normally, alarms are latching which require operator acknowledgement to clear. Choose non latching to allow alarm to clear if it returns to within alarm limits

Slider Max & Slider Min are used solely to format the browser home page for input 'E'

Sidebar:

Every sensor, water meter, flowswitch & each control has alarms.

Typically alarms are used to detect changes in operating conditions, mechanical faults, feed issues & sensor faults

Setting alarms too tight so that they trip frequently under normal operating variances, may result in a critical alarm getting a slow or no response.

Understandably, alarms are set to reflect site practice, chemistry, plumbing & time of year. Periodically review each control loop settings including, its sensor, interlock, pump or actuator.

DCM510 Browser

4.5 Sensor Diagnostics 1 of 3

Select the **A to N** icon on the home page & the **Diagnostic** page will display

Sensor inputs '**C-D**', '**E-F**' and '**I-J**' are used for driver cards so the installed sensor will vary with the type of installed card: pH-ORP, conductivity, 4-20mA input, serial sensor or pH-Temperature

E:pH Sensor

Diagnostic

| | |
|--------------------|----------------------|
| Sensor Type | pH Sensor |
| Variance this hour | 7.31 to 7.40 pH |
| Raw sensor | 737.00 |
| Gain Multiply | 0.0100 |
| Offset Adjust | 0.0000pH |
| Alarmed Low | 16:09:33 2017-Dec-13 |
| Sensor driver type | Dual pH or ORP |
| Configure: 103C | Status: FFFF9003 |
| Device: 000C3A88 | Product: 0E125180 |
| Rev#: 00000001 | S/N: 15082008 |
| A.ID#: 31032004 | A.Part#: 7553329 |
| A.rev#: 0 | Firmware:01.00.05.00 |

Refresh

In this example, there is a pH-ORP card installed in the E-F slot & 'E' is a pH sensor

The **Variance this hour** minimum and maximum help you see at a glance how well the control is/is not working.

The sensor value = **Raw sensor** x **Gain** + **Offset**

Most recent alarm type & time-date

Parameters for the **Dual pH or ORP** card installed in the E-F slot

The sensor value = **Raw sensor** x **Gain** + **Offset**
Single point calibration modifies the **Gain** or **Offset** (varies with sensor type)
Two point calibration modifies both the **Gain** & **Offset**

Parameters for the **Dual 4-20mA input** card

D:Total Chlorine

Diagnostic

| | |
|--------------------|----------------------|
| Sensor Type | CTE Chlorine |
| Variance this hour | 3.05 to 3.06 ppm |
| Sensor Range | 0.00 to 10.00 ppm |
| Raw sensor | 6.70mA 22.5% |
| Gain Multiply | 1.1292 |
| Offset Adjust | -4.5182ppm |
| Paused | 04:59:07 2017-Nov-20 |
| Sensor driver type | Dual 4-20mA input |
| Configure: 003C | Status: 0000 |
| Device: 000C3A9A | Product: 0E120709 |
| Rev#: 00000001 | S/N: 15082008 |
| A.ID#: 31032004 | A.Part#: 7553318 |
| A.rev#: 0 | Firmware:01.00.06.00 |

Refresh

Sidebar:

Diagnostic is a summary of the sensor state.
Contents vary widely with sensor type.

DCM510 Browser

Sensor Diagnostics 2 of 3

Select the **A to N** icon on the home page
& the **Diagnostic** page will display

Sensor inputs '**G**' (4-20mA input)
& '**H**' (10mV/C thermal sensor input)
are fixed in controller hardware
unlike the sensor driver slots @ **C-D, E-F & I-J**

I: CLE3 Chlorine

Diagnostic

| | |
|-----------------------|----------------------|
| Sensor Type | CLE3 Chlorine |
| Variance this hour | 5.80 to 5.84 ppm |
| Sensor Range | 0.00 to 10.00 ppm |
| Raw sensor | 10.99mA 58.3% |
| Gain Multiply | 0.8330 |
| Offset Adjust | -3.3330ppm |
| Alarmed High | 14:52:34 2016-Aug-30 |
| Input Firmware Driver | built-in |
| Configure: 003C | Status: 0003 |
| Device: 000C3B40 | Product: 0E120712 |
| Rev.#: 00000001 | S/N.: 15082008 |
| A.ID#: 31032004 | A.Part#: -1 |
| A.rev#: 0 | Firmware:00.00.00.14 |

Refresh

In this example, a 4-20mA **CLE3 Chlorine** sensor is connect to input '**C**'

The user selected **0.00 to 10.00 ppm** CLE3 sensor type converts the 4-20mA signal (**10.99mA** or **58.3%** of span) from the sensor to a ppm value.

In this example $10.99\text{mA} \times 0.833 - 3.333 = 5.82\text{ppm}$,
the current sensor value.
(ppm = mA x Gain + Offset)

K: Temperature

Diagnostic

| | |
|---------------------|-----------------|
| Sensor Type | Temperature |
| Variance this hour | 77.3 to 173.5 F |
| Raw sensor | 78.0 |
| Gain Multiply | 1.0000 |
| Offset Adjust | 0.0000F |
| No alarm logged | |
| from E, attribute 1 | Temperature |

Refresh

Phantom inputs derived from sensor attributes may be independently calibrated modifying the **Gain** or **Offset** value applied to **Raw Sensor**

In this example the **Temperature** is derived from the sensor connected to input '**E**', **attribute 1**

DCM510 Browser

Sensor Diagnostics 3 of 3

Select the **A to N** icon on the home page & the **Diagnostics** page will display

Or select **Diagnostics** from the pulldown

If sensor used for control then **Variance** shows the range of values as the control operates. Reset on the hour.

The sensor value = **Raw sensor** x **Gain** + **Offset**
Modified in this case by **Thermal Compensation**
After calibration, **Gain** or **Offset** or both will be adjusted

Most recent alarm type & time-date

The remaining items are mainly for technical support troubleshooting

Sensor inputs 'A' & 'B' are used for serial sensors

Serial sensors auto-install on power ON.
If you switch types & the previous type was used for control, the control is disabled

Wiring-connection problems flagged here

Attributes which may be assigned to phantoms 'K' to 'N' (See Section 4.6) are displayed @ the source sensor I/O location. The 'Pitting' or imbalance value in this example

Some fields are specific to the sensor type. In this case the corrosion rate sensor is using Carbon Steel electrodes

C:Conductivity

Diagnostics

| | |
|--------------------|----------------------|
| Sensor Type | Conductivity |
| Variance this hour | 0 to 0 uS |
| Raw sensor | 0 |
| Gain Multiply | 0.1600 |
| Offset Adjust | 0.0000uS |
| Alarmed Low | 13:46:12 2017-Dec-21 |
| Sensor driver type | Dual conductivity |
| Configure: 000C | Status: 0023 |
| Device: 000C3B55 | Product: 0E127777 |
| Rev.#: 00000002 | S/N: 15082008 |
| A.ID#: 31032004 | A.Part#: 7553571 |
| A.rev#: 0 | Firmware:01.00.02.01 |
| Temperature | -7.4F |

Refresh

B:Steel Corrosion

Diagnostics

| | |
|--------------------|----------------------|
| Sensor Type | Corrosion |
| Variance this hour | 11.5 to 11.5 mpy |
| Raw sensor | 11.5 |
| Gain Multiply | 1.0000 |
| Offset Adjust | 0.0000mpy |
| Alarmed High | 12:08:23 2016-Jul-26 |
| Sensor OK | Connected |
| Pitting 0.12mpy | Carbon Steel |

Refresh

Sidebar:

Diagnostic is a summary of the sensor state.
Contents vary widely with sensor type.

DCM510 Browser

4.6 Using Sensor Attributes for Phantoms 1 of 2

4.6.1 Combined Chlorine

Analog phantom sensors are inputs 'K' through 'N' and digital phantom sensors are inputs 'W' through 'Z'. They can be enabled from the **System Enable I/O** page. They are phantom in the sense that they do not have wiring locations.

Once enabled, phantoms will automatically appear on the home page. Phantoms can be assigned attributes from sensors, used to accept manual entries, calculate LSI or combined chlorine.

Calculating Combined Chlorine may be one of the most popular uses of a phantom. Enable a phantom (K through N) and select the icon from the home page



Select the **Configure** menu from the drop down

Choose **Comb. Chlorine** from the Compensation menu. The Combined Cl2 choice will not be available if you do not have free and total Chlorine sensors enabled.

Use this 'input' to control an Ultraviolet system output. Set up the UV control using relays P6 through P9

Select the Total and Free chlorine sensors and press Submit

From the Setup page, edit the name of the phantom as well as other settings if desired.



The interface shows a sequence of steps to configure a phantom sensor for Combined Chlorine. It starts with a 'Configure' menu, followed by selecting 'Comb. Chlorine' from the 'Compensation' dropdown. Then, it shows the 'CTE CGE Sensor' and 'CLO CLE3 Sensor' dropdowns, and a 'Submit' button. Finally, it shows the 'Setup' page where the 'Descriptor' is set to 'Combined Cl2', 'Display Units(UOM)' is 'ppm', and 'Decimal digits' is '0'.

Sidebar:

Phantom Sensors 'K' to 'N' and phantom meters-contact sets 'W' to 'Z' are logged, alarmed & can be used for compensation & controls.

Using Sensor Attributes for Phantoms 2 of 2

4.6.2 Langeliers Saturation Index LSI

M:LSI

Select the **K** to **N** icon on the home page
In this example, we chose phantom 'M' to configure LSI.
(Langeliers Saturation Index)

Configure

Select **Configure** from the pulldown

Compensation

LSI-Ryznar

pH Sensor

E:pH Sensor

Temperature

H:Temperature

Conductivity

I:Conductivity

Reset

Submit

Choose 'LSI-Ryznar' from the dropdown. Fill in the pH, temperature and conductivity sensors by choosing their letter designation.

Some inputs have multiple sensor signals. Each signal requires a unique designation. Phantoms can be used to represent these 'attributes'.
Appendix 'B' lists available **attributes** by sensor type.

N:Flow rate

Configure

Compensation

Not applicable

Select source

Q1:Rate

Reset

Submit

Volume measuring meters have a **Rate** attribute which can be assigned to a phantom sensor.
In this example, the phantom @ 'N' is assigned the turbine meter Q's rate attribute, Q1.

K:Temperature

Configure

Used by I/O

I

Reset

Submit

Select **Source** is no longer available for phantoms once they are linked to other sensors.
In this example the Temperature @ 'K' is used to temperature compensate the sensor 'I'

DCM510_Browser.doc

52

DCM510 Browser

4.7 Inventory: Using feed meters & pumped volumes

Calculate chemical tank inventory by subtracting one or more pump volumes from the tank. Must use frequency pumps and re-calibrate the tank level when filled.

Select the **K to N** icon on the home page to make a phantom input that tracks tank volume.

Select **Configure** from the pulldown

Select **Compensation = Inventory & Submit**

Inventory displays all of the volume measuring inputs & pulse controlled pumps (outputs).

Select all of the meters & pumps that use the target tank & **Submit**.
In this example P6 and P7 pull chemical from the same tank. Their feed volume will be subtracted from this phantom inventory value allowing the user to monitor the tank.

| M:Inventory | |
|-------------------------|---------------|
| Configure | |
| Compensation | Inventory |
| 6:PPM Feed | Target Output |
| 7:PPM Feed 2 | Target Output |
| <div>Reset Submit</div> | |

Initial tank level & tank level on refill is set using **Calibrate**.
Measured & pumped volumes are subtracted from the **Calibrate** value.

| M:Inventory | |
|-------------------|---------|
| Calibrate | |
| Sensor Monitor | Elapsed |
| Enter value | 100 G |
| <div>Submit</div> | |

Sidebar:

Metric or U.S. units are set on the **System / System Setup** page. The pump setup will be in mL/stroke. The controller converts the pumped mL/stroke volume to either Liters or Gallons depending on the **System Setup Metric Units = Yes - No** setting.

Volume meters are assumed to measure either Gallons (U.S. units) or Liters (Metric) when calculating Inventory for tank levels or ppm concentrations.
Scale all of the volume meters according to the System units setting.

5 Water Meters

5.1 Configuring a New Meter

Select the P to V icon from the right side of the home page to configure-setup a new meter or modify an existing meter

Enable new meters @ the **System, Enable I/O** page.
Enabled as a contact set & appears on right side of home page.
See Section 6.1 **Switching Meters and Contact Sets** to switch to meter.

Select **Setup** from the pulldown

| | | |
|--|---|--|
| Descriptor | AutoFill | Edit Descriptor to set site name, 16 characters max. & Submit |
| Display Units(UOM) | G | Edit Units (defaults to system units) , 3 characters max. & Submit |
| Decimal digits | 0 | Select # digits after decimal & Submit |
| Disable | <input type="radio"/> Yes <input checked="" type="radio"/> No | Disable & Sensor Type options only display if meter not in use by another I/O |
| Sensor Type | Turbine meter | |
| <input type="button" value="Reset"/> <input type="button" value="Submit"/> | | |

Select **Sensor Type** = **Turbine Meter** (3 wire meters) or **Water Meter** (contact head, 2 wire) & **Submit** to set meter type

Turbine Meters are scaled by '**K**'**Factor** (pulses/gallon)
Contact head, **Water Meters** are scaled in **Vol/contact** closure.

P:AutoFill

Configure

| | |
|--|---------|
| 'K' Factor | 25.0000 |
| Compensation | None |
| <input type="button" value="Reset"/> <input type="button" value="Submit"/> | |

R:Water meter

Configure

| | |
|--|-------|
| Vol/contact | 100 G |
| Compensation | None |
| <input type="button" value="Reset"/> <input type="button" value="Submit"/> | |

DCM510 Browser

5.2 Flow Rate Alarm

A turbine meter can be used as a flow rate alarm and interlock. This process requires two phantoms, an analog 'Flow Rate' phantom to calculate a rate from a pulse, and a digital phantom to provide other outputs with an Interlock or switch.

Enable and set up a turbine meter as described on the previous page. Enable one digital phantom and one analog phantom. See section 9.6 Enable I/O to enable the phantoms. Analog phantoms range from K to N and digital phantoms W, X, Y and Z. We are using N and Z in the following example below.

Set up the Analog Phantom first

Select the analog Phantom icon from the home page

N:Flow rate

Configure

Compensation Not applicable

Select source P1:Rate

Reset Submit

Select source box

Select the '**Rate**' Attribute from the turbine meter '**P**' created on the previous page. (Can be any turbine meter.) Press **Submit**.
The name of this phantom will change to '**Flow rate**' automatically. Use the Setup menu to edit if desired.

Set up the Digital Phantom second

Select the digital Phantom icon from the home page

Z:Contact set

Setup

Descriptor Rate Flowswitch

Disable Yes No

Reset Submit

Name the digital phantom in the Setup menu

Select Configure from the pulldown

Z:Rate Flowswitch

Configure

Compensation Rate Flowswitch

Flowrate sensor N:Flow rate

Flowswitches 16.0 gpm

Invert sense Yes No

Reset Submit

Choose Compensation as Rate Flowswitch Press **Submit**.
Then find the analog phantom just created as the Flowrate sensor. Press **Submit**.
Third, enter a setpoint in the Flowswitches box.
Now, phantom Z can be used to interlock any and all outputs.
When the flow is above the setpoint, the output will be enabled.

DCM510 Browser

5.3 Pulse to Analog Output

5.3.1 Configuration of a VFD control output 1 of 3

In addition to remotely controlling a Variable Frequency Drive (VFD) manually, the DCM510 now has the ability to control a VFD to a flow rate setpoint, and even use an alternate setpoint to control to an energy saving lower flow rate during off hours. The most common configuration will use a square wave pulse flowmeter (Signet 2536 Blue Cap) and a 4-20mA output. One of each of these will need to be enabled and configured for this purpose. The DCM510 uses its Output Events programming routines to control a VFD to a flow rate input, so a dedicated relay output will also be used.

The steps in the example below will walk you through enabling and configuring the I/O's needed to control a VFD to a flow rate setpoint in Gallons per Minute (GPM).

P:Recirculation FI

Setup

Descriptor: Recirculation FI

Display Units(UOM): G

Decimal digits: 0

Disable: Yes ☐ No ☒

Sensor Type: Turbine meter

Reset Submit

Step 1:
Enable and set up a Turbine meter. See section 5.1 **Configuring a New Meter...**
Edit the Descriptor and Sensor Type in the Setup menu. Edit the 'K' Factor in the Configure menu. Press **Submit**

Recirculation FI

Configure

Factor: 25.000

Compensation: None

Reset Submit

M:Flow Rate

Configure

Compensation: None

Select source: none

Reset

A0: Unassigned
A1: Temperature
B0: Corrosion
B1: Pitting
C0: Conductivity
C1: Temperature
D0: Conductivity
D1: Temperature
E0: pH Sensor
E1: Temperature
F0: ORP Sensor
G0: Generic 4-20mA
H0: Temperature
H1: Rate
P1: Rate
none

Flow Rate

Setup

Descriptor: Flow Rate

Display Units(UOM): GPM

Decimal digits: 1

Disable: Yes ☐ No ☒

Submit

Step 2:
Enable an analog Phantom input. See section 9.6 **Enable I/O**. Select the letter icon from the home page

In the **Configure** menu use **Select source** to choose the letter that designates the watermeter. P1 in this case. Press **Submit**

Use the **Setup** page to name this point "Flow Rate" and enter 'GPM' as **Display Units**. Press **Submit**

DCM510 Browser

Configuration of a VFD control output 2 of 3

Step 3:

Enable a relay, 1 through 5 to use for the control setpoint. (Relay 5 in this example.) Enable a 4-20mA output.

The screenshot displays the DCM510 Browser configuration interface for a VFD control output. The interface is divided into several sections, each with a tab and a set of fields.

5:R5 unused (Tab): This section is currently inactive.

Setup (Tab): This section contains the following fields:

- Control Type**: A dropdown menu set to **Events-Other**.
- Relay**: A dropdown menu set to **5:R5 unused**.

5:VFD Control (Tab): This section contains the following fields:

- Descriptor**: A text field set to **VFD Control**.
- Disable**: A toggle switch set to **No**.
- Special Control**: A dropdown menu set to **Recirc Pump**.
- VFD 4-20mA out**: A dropdown menu set to **J:Recirc Output**.
- %ON in Event**: A text field set to **0.0%**.
- Flow rate**: A dropdown menu set to **none**.
- Rate Setpoint**: A dropdown menu set to **M:Flow rate**.

5:VFD Control (Tab): This section contains the following fields:

- Event setpoint**: A text field set to **250.0**.
- Flow rate**: A dropdown menu set to **M:Flow rate**.
- Rate Setpoint**: A text field set to **400.0**.
- VFD Maximum**: A text field set to **1000 gpm**.
- Control error gain**: A text field set to **0.250**.

Callouts and Instructions:

- Step 3:** Enable a relay, 1 through 5 to use for the control setpoint. (Relay 5 in this example.) Enable a 4-20mA output.
- Select the enabled relay from the Home screen. Verify the Control Type to be Events-Other.**
- Edit the Descriptor and choose Recirc Pump in the Special Control pull down. Press Submit**
- Use the VFD 4-20mA out drop down to choose the 4-20mA output you enabled above. Press Submit**
- Pick the Phantom configured in Step 2 as the Flow rate. Press Submit**
- Enter the Rate Setpoint for control. Add an Event Setpoint if you wish to use the event function to, for example lessen the flow rate during slow periods; evenings or early mornings, etc.**
- The VFD Maximum is the 20mA rate for the recirculation pump speed. The Control error gain is used to set the reaction rate for the controller. Increase this value to increase the output reaction to changes in the flow rate input. Press Submit.**

DCM510 Browser

Configuration of a VFD control output 3 of 3

J:Recirc Output

Setup

Descriptor

Recirc Output

Disable

Yes

☒

No

Reset

Submit

Step 4:

Open the 4-20mA output from the home screen.
Edit the **Descriptor** field and press **Enter**

In the **Control by** dropdown, choose the phantom we set up in step 2 above. Press **Submit**

J:Recirc Output

Configure

Control by:

Flow rate

Manual mode

Yes

☒

No

20mA Value

100.0 gpm

4mA Value

0.0 gpm

Interlocked

none

Open Loop alarm

☒

Yes

No

Controls a Pump

Yes

☒

No

Reset

Submit

Set the **20mA Value** for the **VFD maximum**, the same as on the relay in step 3 above.

Use the Interlock and open loop features if desired. The Interlock would **not** be advisable in this example since we do not want the recirculation pump to stop if someone shuts off the flow to the sensors for calibration or cleaning. Open Loop means if a wire comes loose or the 4-20mA output is not wired correctly, the mA signal will drop below 3.8mA and set off an alarm.

Controls a Chemical Pump means the output will drop to 4mA if the interlock is inactive (Off) or if the red **Stop/Start** button on the controller keypad is active. When **Controls a Pump** is not selected, the **Start/Stop** button on the keypad will have **no** effect on the 4-20mA output, but the output will be affected by the interlock, so **do not use an interlock** on a recirculation pump application.

DCM510_Browser.doc

58

DCM510 Browser

5.4 Meter Diagnostics

Select the P to V icon from the right side of the home page to view the Diagnostic page

Meters display the volume measured from midnight on the home page.

P: turbine meter

Diagnostic

or select **Diagnostic** from the pulldown

| | |
|-----------------------|----------------------|
| Sensor Type | Water meter |
| Vol. this year | 181221.59 G |
| 19 Days Online | Vol/Day,9537.98 G |
| Volume Total | 181221.59 G |
| Vol. last year | 0.00 G |
| Rate | 6.0gpm |
| No alarm logged | |
| Input Firmware Driver | built-in |
| Configure: 0000 | Status: 0000 |
| Device: 000C4E31 | Product: 0E12519A |
| Rev.#: 00000001 | S/N:: 15082008 |
| A.ID#: 31032004 | A.Part#: -1 |
| A.rev#: 0 | Firmware:01.01.02.00 |

Refresh

Total since meter enabled

Rate as of the moment the diagnostic page was opened. This is not a live value. Press Refresh to update.

Volume resolution (digits after the decimal) is set by **Decimal Digits** on the **Setup** page

Turbine type meters calculate **Rate** every second as meter pulse counts are measured. Therefore **Rate** is more representative than contact head meter rates because counting occurs more frequently.

DI (Digital Input) driver detail Shared by all inputs 'O' thru 'V'

Q:Water meter

Diagnostic

| | |
|-----------------------|----------------------|
| Sensor Type | Turbine meter |
| Vol. this year | 76927.01 G |
| 20 Days Online | Vol/Day,3846.35 G |
| Volume Total | 798929.50 G |
| Vol. last year | 0.00 G |
| Rate | 19.7gpm |
| No alarm logged | |
| Input Firmware Driver | built-in |
| Configure: 0001 | Status: 0000 |
| Device: 000C4E31 | Product: 0E12519A |
| Rev.#: 00000001 | S/N:: 15082008 |
| A.ID#: 31032004 | A.Part#: -1 |
| A.rev#: 0 | Firmware:01.01.00.05 |

Refresh

DCM510 Browser

5.5 Meter Alarms

Select the P to V icon from the right side of the home page to view the Diagnostic page

or select **Diagnostic** from the pulldown

P:Feedwater

Alarms

| | |
|----------------|---|
| HiAlarm | 50000 G |
| LoAlarm | 100 G |
| Alarm Relay | <input type="radio"/> Yes <input checked="" type="radio"/> No |
| Disable Alarms | <input type="radio"/> Yes <input checked="" type="radio"/> No |

Reset Submit

HiAlarm is the volume measured from midnight. Edit & Submit

LoAlarm is set on the daily volume. It's checked only once @ midnight. Edit & Submit

Alarm Relay = Yes & Submit will turn ON the alarm relay if one has been configured.

Disable Alarms = Yes stops new alarms on meter input 'P' in this example.

If alarmed, a **Clear alarms** option will be included on this page.

If you clear a **HiAlarm** & the day has not changed, it may re-alarm if todays volume increases more than **HiAlarm** before midnight.

In this example, we want an alarm on any any **Water** make-up
But don't want an alarm if there is no **Water** make-up
(so **LoAlarm** is less than zero)

In this example, we're also using one of the relays or pulse outputs as a dedicated alarm relay, perhaps to the site DCS. By choosing **Alarm Relay = Yes**, when this I/O point is in alarm, the alarm relay will be activated.

P:Feedwater

Alarms

| Status | Adjusted Alarm |
|----------------|---|
| HiAlarm | 10.00 G |
| LoAlarm | -100.00 G |
| Alarm Relay | <input checked="" type="radio"/> Yes <input type="radio"/> No |
| Disable Alarms | <input type="radio"/> Yes <input checked="" type="radio"/> No |

Reset Submit

6 Flowswitches, System Interlocks & Contact Sets

6.1 Switching Meters & Contact Sets

Volume meters and contact set inputs are connected in the 'O' to 'V' digital inputs. They are also in the 'W' to 'Z' phantom inputs.

If the meter or contact set input is not being used for control, it can be re-purposed, making a contact set a meter or the inverse.

When an input in the 'O' to 'Z' phantom input is enabled, it's initially configured as a contact set. Any contact set designated as a system flow switch cannot be changed by the user. See Sidebar below.

Contact sets are ON when the contact set is closed. With the exception of the system flow switch(es), the logical sense of the input may be inverted so that ON = contact set open. (Refer to Section 6.3 Inverting a Contact Set).

Select the **O** to **V** icon from the right side of the home page

Select **Setup** from the pulldown

Choose Contact Set

Changing the DI (digital input) type using **Sensor Type** is not available if the DI is in use by a control or interlock. Clear the usage from the other I/O, then this choice will be returned to this menu

In this example, input O is a System interlock used by relays 2, 4, 6 and 7. The information in the **Used by I/O** box indicates it is a System interlock for System 1.

Interlock R is set as the System 2 interlock and is used on relay 3.

U:Low_Level

Setup

Descriptor: Low_Level

Disable: Yes ☐ No ☒

Sensor Type: Contact set

Reset Submit

O:Sample Flow

Setup

Descriptor: Sample Flow

Used by I/O: 2,4,6,7,Sys

Reset Submit

R:Spa Flowswitch

Setup

Descriptor: Spa Flowswitch

Used by I/O: 3,Sys2

Reset Submit

Sidebar: System Interlocks.

From the factory, each system will have at least one System Interlock. This input cannot be disabled by the user. This ensures that the safety flow switch cannot be accidentally ignored. Contact the factory if this needs to be changed.

DCM510 Browser

6.2 Contact Set Alarms

Select the **O** to **V** icon from the right side of the home page

Select **Alarms** from the pulldown

With the **On Time Alarm** set for more than 1440, the total number of minutes in a day, this alarm is disabled.

The **No Flow Alarm** is set to 5 minutes to reduce the likelihood of a nuisance alarm. The switch must be off for 5 contiguous minutes to create an alarm condition

A system flow switch, as in this example, will ignore the OFF Time Alarm minutes and alarm immediately to maximize safety.

Alarms use the time ON or OFF today which is reset to 0.0 @ midnight.

If you are not using the alarms, set **Disable Alarm = Yes** & **Submit**
It is not recommended that you disable the alarm of a recirculation water flowswitch.

In this example, we're using the alarm to alert us if the recirculation water is offline for more than an hour. Or set this value to a few minutes to know immediately if the recirculation water has stopped.
Edit & **Submit** to modify

| O:Pool flowswitch | |
|--|---|
| Alarms | |
| ON Time Alarm | 1441.0 minutes |
| OFF Time Alarm | 5.0 minutes |
| Alarm Relay | <input type="radio"/> Yes <input checked="" type="radio"/> No |
| Disable Alarms | <input type="radio"/> Yes <input checked="" type="radio"/> No |
| <input type="button" value="Reset"/> <input type="button" value="Submit"/> | |

| S:Flowswitch | |
|--|---|
| Alarms | |
| ON Time Alarm | 1500.0 minutes |
| No Flow Alarm | 60.0 minutes |
| Alarm Relay | <input type="radio"/> Yes <input checked="" type="radio"/> No |
| Disable Alarms | <input type="radio"/> Yes <input checked="" type="radio"/> No |
| <input type="button" value="Reset"/> <input type="button" value="Submit"/> | |

Sidebar:

Contact set alarms are frequently used to flag unusual operating conditions or outages.

If you are alarming on an event that bridges midnight, bear in mind that the ON or OFF time that trips the alarm is reset @ midnight.

6.3 Inverting a Contact Set

Contact sets are digital inputs that can be 'ON' when they sense a closed contact. The controller can just as easily consider the closed contact to be an 'OFF' signal. This is the inverted sense. In this way, the controller can adjust the input from a digital device to be considered an 'ON' signal from a normally open (NO) contact or a normally closed (NC) contact.

Q:Contact set

Configure

| | |
|--------------|------------------|
| Compensation | None |
| Invert sense | <div>YesNo</div> |

Reset

Submit

To invert the input, select 'Yes' and press Submit.

Sidebar:
The controller will not allow you to invert the input signal from a system flow switch.

7 Frequency Controlled Pumps

7.1 Adjusting mL/stroke

Select the '6' to '9' icon from the right side of the home page

Select **Configure** from the pulldown

Configure the output relay so the controller knows how much chemical is being fed over time. This enables the controller to calculate a tank level.

If the stroke knob is set for anything less than 100%, recalculate the mL/stroke value or the controller will assume the maximum rate. For example, if the rate is 0.130 and you reduce the stroke to 50%, the mL/stroke will need to be changed to 0.065.

If you are not using a ProMinent pump, select Other for Pump Type, edit **mL/stroke** & **Rated SPM** for the installed pump & **Submit**
Pumps are limited to 25 **mL/stroke**.
No minimum limit.

| 6:Acid pump | |
|--|---|
| Configure | |
| Descriptor | Acid pump |
| Decimal digits | 2 |
| Disable | <input type="radio"/> Yes <input checked="" type="radio"/> No |
| Control Action | ON decreases sensor |
| Special Control | None |
| Pump Type | ProMinent 1602 |
| mL/stroke | 0.130 |
| <input type="button" value="Refresh"/> <input type="button" value="Submit"/> | |

| 9:Acid pump | |
|--|---|
| Configure | |
| Status | Reconfigured |
| Descriptor | Acid pump |
| Decimal digits | 2 |
| Disable | <input type="radio"/> Yes <input checked="" type="radio"/> No |
| Control Action | ON decreases sensor |
| Special Control | None |
| Pump Type | Other |
| mL/stroke | 0.100 |
| Other Pump | 240 Rated SPM |
| <input type="button" value="Refresh"/> <input type="button" value="Submit"/> | |

Sidebar:

Be aware that the output rate of most pumps will vary with changes in backpressure from the process. ProMinent recommends a backpressure valve to ensure the pump output pressure remains constant.

DCM510 Browser

8 4-20mA Outputs

8.1 Configure: Manual-Auto Switch

Select the letter icon from the bottom right side of the home page

A newly installed 4-20mA out card initializes to Manual mode & 0% (4mA) output current

Select **Configure** from the pulldown

Select **Control by:** and the target control sensor from the pull down & **Submit**

Edit **Manual mode** level & **Submit** to modify the current.
0.0% = 4 mA 100% = 20 mA

(Optional) When the Interlocked contact set input is OFF, the current is set to 4mA
Set **Interlocked** = target contact set & **Submit**

Controls a Pump = Yes goes to 4mA when **STOP** key pressed. (Think 'Chemical' pump, not recirc pump.)

Switch to Auto mode by selecting **Manual mode = No** & **Submit**

In Auto mode, edit both **20mA Value** & **4mA Value** & **Submit**

In this example, a pH of 7.5 would set the 4-20mA output to 10mA
 $(16\text{mA} \times (7.5 - 6.0) / (10.0 - 6.0)) + 4\text{mA}$

| Control by: | Manual mode | Interlocked | Open Loop alarm | Controls a Pump |
|-------------|---|-------------|---|---|
| None | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> | none | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |

| Control by: | Manual mode | Manual mode | Interlocked | Open Loop alarm | Controls a Pump |
|-------------|---|-------------|-------------------|---|---|
| pH Sensor | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> | 8.0 % | O:Pool flowswitch | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |

Sidebar: Manual Mode

Use **Manual mode** to A) verify the pump is 100% ON=20mA, completely OFF=4mA, and B) to verify the loop span on the monitoring DCS that is using the current loop value to represent a controller pH, ORP, corrosion rate sensor or ppm calculation.

DCM510 Browser

8.2 Calibrate 4-20mA Outputs

Select the letter icon from the home page

Select **Calibrate** from the pulldown

Calibrate overrides the Manual setting or sensor control to set the output to 4mA & then 20mA

Select **Start** to start the two point calibration process

| I:4-20mAOutput | |
|--|---|
| Calibrate | |
| Sensor Monitor | Elapsed |
| 4-20mA = 4mA | <input checked="" type="checkbox"/> START |
| Factory Reset | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| <input type="button" value="Submit"/> <input type="button" value="Calibrate"/> | |

| I:4-20mAOutput | |
|--|---------|
| Calibrate | |
| Sensor Monitor | Elapsed |
| Output @ 4mA | 4.01 |
| <input type="button" value="Calibrate"/> | |

Use the mA current value displayed on the pump, measured by the DCS or milliammeter to determine the actual output from the controller. Enter this value here.

| I:4-20mAOutput | |
|--|-------------------|
| Calibrate | |
| Sensor Monitor | Elapsed |
| Output @ 20mA | 20.00 mA measured |
| <input type="button" value="Calibrate"/> | |

Edit **Output @ 20mA** level & select **Calibrate**

Calibration ends.

| I:4-20mAOutput | |
|--|---|
| Calibrate | |
| Status | Calibrated |
| 4-20mA = 4mA | <input checked="" type="checkbox"/> START |
| Factory Reset | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| <input type="button" value="Submit"/> <input type="button" value="Start"/> | |

Factory Reset = Yes & Submit
Returns the 4-20mA outputs to default factory calibration

DCM510 Browser

8.3 Diagnostic – 4-20mA Outputs

Select the letter icon from the bottom right side of the home page to display **Diagnostic** page

Or select **Diagnostic** from the pulldown

Controlling sensor name

Gain & Offset are modified when a 4-20mA output is calibrated.
Factory Reset: **Gain** = 1.0 & **Offset** = 0.0

| | |
|--------------------|----------------------|
| J:4-20mAOutput | |
| Diagnostic | |
| Sensor Type | 4-20mAOutput |
| Control by: | pH Sensor |
| Gain Multiply | 1.0057 |
| Offset Adjust | 0.0031mA |
| Sensor driver type | Dual 4-20mA Output |
| Configure: 003C | Status: 0000 |
| Device: 000C3A55 | Product: 0E125188 |
| Rev.#: 00000001 | S/N: 15082008 |
| A.ID#: 31032004 | A.Part#: -1 |
| A.rev#: 0 | Firmware:00.00.00.01 |
| Refresh | |

4-20mA in **Manual mode**
Shows both loop current & % of span
(for loops controlling pumps)

4-20mA Output driver detail
Shared by inputs 'I' & 'J'

| | |
|--------------------|----------------------|
| I:4-20mAOutput | |
| Diagnostic | |
| Sensor Type | 4-20mAOutput |
| Manual Setpoint | 12.96mA 56.0% |
| Gain Multiply | 1.0000 |
| Offset Adjust | 0.0000mA |
| Sensor driver type | Dual 4-20mA Output |
| Configure: 033C | Status: 0000 |
| Device: 000C3A55 | Product: 0E125188 |
| Rev.#: 00000001 | S/N: 15082008 |
| A.ID#: 31032004 | A.Part#: -1 |
| A.rev#: 0 | Firmware:00.00.00.01 |
| Refresh | |

DCM510 Browser

9 System Settings

9.1 Home & Diagnostic pages

The image shows two screenshots of the DCM510 Browser interface. The top screenshot is the 'System' page, and the bottom screenshot is the 'Diagnostic' page. Both pages have an orange header bar with the page title and a pull-down menu. The 'System' page has a table with user information and session controls. The 'Diagnostic' page has a table with system status and configuration parameters. Annotations with arrows point to specific elements on both pages, explaining their function.

System Page:

- System:** Header bar with a pull-down menu.
- Home:** Pull-down menu.
- 2017-Nov-20** | **S/N:2017057142**: Date and serial number.
- Status**: Logged in.
- Current User**: admin.
- Logout**: Yes button.
- Keep session active**: Yes, No buttons (No is selected).
- Reset** | **Submit**: Action buttons.

Diagnostic Page:

- System: Diagnostic**: Header bar with a pull-down menu.
- Diagnostic**: Pull-down menu.
- Serial number**: 2017057142.
- Firmware**: 17.10.08.00.
- HMI Firmware**: 16.07.11.00.
- Web Browser HMI Version**: 02.00.00.00.
- Relay Fuse**: OK.
- Watchdog Resets**: 6.
- Admin Password**: Default.
- O-T wiring**: OK.
- U-V wiring**: OK.
- Fan speed**: 3990 RPM.
- Events**: Mon, WEEK 2.
- Refresh**: Action button.

Annotations:

- Select the controller icon at the top of the home page to get to the **System** pull down
- The serial number is used to track your controller. Use this when contacting the manufacturer.
- Status and User information duplicated from top, right of Home page
- Logout here or on the home page. Logs out automatically if no activity for 30 minutes
- Disables the 30 minute timer
- Select Diagnostic from the pull down
- The last three digits of the serial number are used to ID E-mail and tags the log & activity files
- Line power fuse status for relays 1 & 2. Typically includes protection for relays 3-5 unless they are externally powered.
- Accumulates unexpected CPU stops. Should read 0. Check incoming power.
- Default = AAAA, otherwise known only to the Admin user
- Power for 3-wire turbine meters connected to inputs 'O' through 'T'
- Power for 3-wire turbine meters connected to inputs 'U' and 'V'. 'U' and 'V' have a different power supply than O-T. (Some older versions of firmware show one entry for O-V.)
- Cooling fan fault shuts down all sensor driver cards & output controls. Displays only fault message on local LED screen.
- Events are entered as daily, weekly or monthly (28 days). In daily, every day is day =1. In weekly, every Sunday is Sunday = 1. This page shows the 28 day cycle. This is day 9 of 28.

DCM510 Browser

9.2 Activity Log:

9.2.1 User ID, time stamp

System: Activity Log Select **Activity Log** from the **System** pulldown

Activity Log

82 Events, 41-50 Initially displays the current day's activities in blocks of 10

Sep
1 View another day: Select Month & Day & **Submit**
(last six months selectable)

| IO | Activity | User ID | Time |
|----|--------------------------|---------|----------|
| A: | Alarms Alarmed High | System | 12:38:01 |
| C: | Alarms Alarmed High | System | 12:38:01 |
| E: | Alarms Alarmed Low | System | 12:38:01 |
| F: | Alarms Alarmed Low | System | 12:38:01 |
| L: | Alarms Scale Alarm | System | 12:38:01 |
| M: | Alarms Alarmed High | System | 12:38:01 |
| S: | Activity Adjusted Alarm | admin | 12:38:52 |
| U: | Activity Changed | admin | 13:40:30 |
| U: | Activity Changed | admin | 13:40:41 |
| U: | Configure Compen. modify | admin | 13:41:04 |

Next Back Submit

This list shows activities both by **User ID** & those that occur Automatically (**System**).

Examples:

- The System logged the Alarmed phantom input M.
- The System logged the admin users' adjustment of the Alarms on Input 'S'

Next selection not shown @ end of day's activities
In this example, we are viewing events 41-50 of 82 total activities

If you select a day when the controller was powered OFF or prior to it's installation, you'll get this response

System: Activity Log

Activity Log

0 Events, 1-0

May
1

No activity file

Submit

DCM510 Browser

9.3 Communications:

9.3.1 LAN IP, Netmask, MAC, Gateway, Wifi IP

You'll need to be logged in as the admin user to modify **Communications**.

The top of the page will prompt you with the required login access level if you are not allowed to modify the current page.

The controller includes a **DHCP client** (Dynamic Host Configuration Protocol).

If **DHCP is off**, you'll need to assign a static IP to the controller that is valid on that LAN (Local Area Network – Ethernet). The controller will remain at this IP unless manually changed.

If **DHCP is on**, the controller will acquire an IP address from a **DHCP server**. Thus, it must be on a LAN with a DHCP server. This address may change periodically without notice. Consult the plant IT department for assistance. If not available, call ProMinent technical support.

The screenshot shows the 'System: Communications' configuration page. The 'System' dropdown is set to 'Communications'. The 'LAN IP Address' is 10.10.6.120. The 'DHCP' section has 'Yes' and 'No' buttons, with 'No' selected. The 'LAN Netmask' is 255.255.255.0. The 'LAN MAC Address' is 00:1e:c0:ef:6b:a3. The 'LAN Gateway' is 10.10.6.19. The 'LAN Primary DNS' is 8.8.8.8. The 'LAN Secondary DNS' is 8.8.4.4. The 'WiFi IP Address' is 192.168.1.1. The 'WiFi Netmask' is 255.255.255.0. The 'WiFi SSID' is DCM5_142. There are 'Reset' and 'Submit' buttons at the bottom.

Annotations:

- Select **Communications** from the **System** pulldown
- Static IP **LAN** address of the controller
CAUTION: If you edit & **Submit** to modify, you'll lose the current browser connection on the current IP. Re-connect using the new IP Address
- DHCP lets the controller find an acceptable address
- Set **LAN Netmask** to desired netmask & **Submit**.
Typically, and by default, 255.255.255.0
- If you are using the E-mail functionality (alarms & auto-reporting), then the **LAN Gateway** should match other devices on this LAN. Consult the IT department
- Controller WiFi is limited to HTTP, browser services for mobile devices & notebook WiFi.
We use a fixed IP address
- The WiFi SSID defaults to **DCM5_xxx** where **xxx** = last 3 numbers of the controller serial number. Edit (16 characters maximum) to modify & **Submit**

DCM510 Browser

Sidebar:

If you modify the IP or Netmask & can no longer connect, the current IP & Netmask can be viewed on the local HMI (keypad & display) or use alternate connection method; WiFi/LAN.

From Keypad: **Menu / Up / System / OK / Communication / OK** then scroll through the settings.

If you switch from Static to DHCP, the IP and possibly the Gateway will change.

LAN (Local Area Network) refers to the Ethernet port connection. WiFi refers to the wireless connection. See section **1.1 The WiFi Connection** for connection information.

9.4 Time & Date:

9.4.1 Sync to Device

The screenshot shows the 'System: Time & Date' configuration page. The page has an orange header with the title 'System: Time & Date'. Below the header is a dropdown menu labeled 'Time & Date'. A link 'Set fields to match my computer' is present. Below the link are three input fields: 'Date DD/MM/YY' with the value '01/12/17', 'Time HH:MM:SS' with the value '15:08:15', and 'Weekday' with the value 'Fri'. At the bottom are 'Reset' and 'Submit' buttons. Annotations with arrows point to the dropdown menu, the 'Set fields to match my computer' link, the Date field, the Time field, and the Weekday field. A separate annotation points to the 'Submit' button.

Select **Time & Date** from the **System** pulldown

This is usually the easiest way to match the controller date and time to your device. Click on the link & **Submit**.

-OR-
Edit the **Date**, **Time** & **Weekday** fields & **Submit**
Follow the formatting for the **Date** (DD/MM/YY) and **Time** (HH:MM:SS) fields to avoid an error message

Adjusting the time & date affects feed events, controls that use time, data logging, alarming.....

9.5 E-Mail Setup – Test

System: E-mail Setup

E-mail Setup

| | |
|----------------------|---|
| E-mail Enabled | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| E-mail day's summary | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| E-mail on Alarm | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| SMTP Server | <input type="text" value="192.40.165.68"/> |
| Site SMTP server | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| Test E-mail | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| Next mail | 7.98hrs |

Reset

Submit

Select E-mail Setup from the System pulldown

E-mail Enabled = Yes sends a daily E-mail @ noon so you know the controller is operational. Sensor values confirm control. E-mail services enable.

E-mail day's summary = Yes sends a midnight E-mail. Includes sensor values, run times, volumes....

E-mail on Alarm = Yes sends an E-mail to all enabled email users when a controller alarm occurs. Includes sensor values & volumes so you get operating context

This is the default SMTP server address. If this does not work, the customers IT personnel should be notified. They are blocking this traffic.

Whenever you modify E-mail parameters, set Test E-Mail To = Yes & Submit to verify your changes

Select Refresh every few seconds. The status line on this page will show if you are getting blocked from reaching the SMTP server

The email test status report will be sent to all users that are email enabled. See the User Setup page in the System menu.

If you choose a different SMTP server, select Site SMTP and fill in the new server address, port, user name and password
Your IT personnel should have this information

System: E-mail Setup

E-mail Setup

| | |
|----------------------|---|
| E-mail Enabled | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| E-mail day's summary | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| E-mail on Alarm | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| Site SMTP server | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| SMTP Server | <input type="text" value="45.45.45.45"/> |
| Server Port | <input type="text" value="25"/> |
| Username | <input type="text" value="Unassigned"/> |
| Password | <input type="password" value="*****"/> |
| Test E-mail | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| Next mail | 8.02hrs |

Reset

Submit

DCM510 Browser

9.6 Enable I/O:

9.6.1 Enable IO, Assign to System#

All I/O points can be enabled and used by the controller. Enabled points are displayed on the main screen. If a point is disabled, it is removed from the main screen and has no programmable function.

If you select two systems, (See System Setup menu, section [9.7 System Setup](#)) you will see the menu on the left. This menu page will allow you to select which system each I/O is a part of. A single system user will see a different menu, shown in the lower right corner of this page.

The main interface is titled "Enable I/O" in an orange header. Below the header is a table with two columns: the first column lists I/O types, and the second column contains dropdown menus for selecting a system. The I/O types listed are: Configure, C:Free Chlorine, D:Total Chlorine, E:pH Sensor, F:ORP Sensor, H:Pool Temp, I:Free Cl Output, J:Total Cl Output, M:Combined Cl2, N:Flow rate, and Enable I/O. The dropdown menus show the following selections: Sensor, Pool1, Pool1, Pool1, Pool1, Shared, Pool2, Pool2, Pool2, Shared, and none. At the bottom of the table are "Reset" and "Submit" buttons. Annotations with green arrows point to various elements: "Select **Enable I/O** from the **System** pulldown" points to the header dropdown; "To select a System# for **Sensor** or **Control** or **Meter-Contact Set**, select **Configure** to I/O type & **Submit**" points to the "Configure" row; "If the **System Setup** page field **# of Systems** = **Two** Enable I/O shows selectors for each I/O type." points to the "Shared" and "Pool2" dropdowns; "Select I/O you wish to enable or **None** & **Submit**" points to the "Enable I/O" row and its dropdown. A separate box titled "System Setup page field # of Systems = One Is limited to **Enable IO**" shows a simplified version of the interface with a single dropdown menu labeled "Y:Contact set".

| Enable I/O | |
|-------------------|--------|
| Configure | Sensor |
| C:Free Chlorine | Pool1 |
| D:Total Chlorine | Pool1 |
| E:pH Sensor | Pool1 |
| F:ORP Sensor | Pool1 |
| H:Pool Temp | Shared |
| I:Free Cl Output | Pool2 |
| J:Total Cl Output | Pool2 |
| M:Combined Cl2 | Pool2 |
| N:Flow rate | Shared |
| Enable I/O | none |

Reset Submit

System Setup page field # of Systems = One
Is limited to **Enable IO**

| Enable I/O | |
|------------|----------------|
| One System | No View-Config |
| Enable I/O | Y:Contact set |

Reset Submit

DCM510 Browser

9.7 System Setup:

9.7.1 Naming, Sunday=Day1 ,Metric Units, Restart Options

You'll need to be logged in as the admin user to modify **System Setup**.

The top of the page will prompt you with the required login if you are not allowed to modify the current page.

System Setup

Select **System Setup** from the **System** pulldown

System Setup

Site Name & System-Names will tag your reports & E-mail alarms to differentiate controllers. Sixteen characters maximum. Edit & Submit

Site name: PFC DCM510

System-Name: Pool1

2nd System-Name: Pool2

Select **Keypad Password** = **Yes** & **Submit**
Require keypad users to logon.

Keypad Password: Yes ☒ No

Requires the user ID to be typed. Not available from the dropdown.

Login requires userid: Yes ☒ No

Metric Units = **Yes** & **Submit** displays temperatures in 'C' & measures volumes in Liters. **Metric Units** = **No** & **Submit** displays temperatures in 'F' & measures volumes in Gallons

Metric Units: Yes ☒ No

Select **Sunday=Day 1** = **Yes** & **Submit** Resets the 28 day event clock to the current week. For example if today is Wednesday, sets today to day #4
Note: This option only displays if not already week #1.

Sunday=Day 1: Yes ☒ No

System Type: Select Single, Pool 1 & 2 or Pool & Spa

System Type: Pool1 & Pool2

Flow ON delay: 45 seconds

Outputs remain off after flow restoration based on this setting.

Pool1 Flowswitch: 0:Sample Flow

Pool2 Flowswitch: none

System flow switches cannot be removed. This prevents accidental chemical feed during no sample flow condition.

Alarm on STOPs: ☒ Yes ☐ No

Select **Alarm on STOPs** = **Yes** & **Submit** to alarm when user presses the STOP button on controller keypad or if any output is forced off.

System restart: Yes ☒ No

Select **System restart** = **Yes** & **Submit**
Same effect as cycling the power OFF-ON; reboots CPU, then restarts controls & actuation times

Factory Reset: Yes ☒ No

Enable Alarm Chime: Yes ☒ No

Select **Enable Alarm Chime** = **Yes** & **Submit** for audible tone on alarm

Reset **Submit**

CAUTION: Make sure to have a valid configuration file to use as this function will erase almost all setup parameters except user ID's and Passwords. See section **10.2.1 USB – Save or Load the Program Configuration**

Select **Factory Reset** = **Yes** & **Submit** This removes user settings, controls, naming, calibration... Load a default or previously saved configuration after **Factory Reset** to avoid enabling and reconfiguring each I/O.

DCM510 Browser

9.8 User Setup:

9.8.1 View-Set Access Level and Passwords

System: User Setup Select **User Setup** from the System pulldown

User Setup

Status: Login @ Admin Status shows who is logged in. Only the **Admin** user can change the Access Level for other users

User ID: admin

New Password: AAAA Edit your password & **Submit**
In this example, the default **Admin** password is shown

Confirm Password: AAAA

Pause E-mails: Yes ☒ No Select Pause Emails to temporarily stop email to your address

Notify E-mail: Jones.Jeff@ABC.com

E-mail status @ noon: ☒ Yes ☐ No Choose to receive Status updates via email at noon and/or a midnight summary to periodically verify controller operation and regularly archive data

E-mail day's summary: ☒ Yes ☐ No

E-mail Escalation: Final E-mail on alarm Choose if and when you will receive alarm email if enabled above. If alarm is not corrected, notice level is elevated based on these user settings

Select User: Blocked
First E-mail on alarm
Next E-mail on alarm
Final E-mail on alarm

Reset Submit

Select User: 0,A:Public As Admin, you can select any user and set up their email notification program. Select the user and Submit.

0,A:Public
0,A:Public
1,0:Operator1
2,0:Operator2
3,0:Operator3

Select User: 10,0:Operator10 Select User you wish to edit and select Enable = Yes. Submit

User ID: reset pswd,'O'perate,'C'fg.'A'dmin:

Enabled: ☒ Yes ☐ No

Access Level: Operate Choose the Access Level for this User. Operators can view all controller pages but do not have access to most System pages. Configure users can edit the program but no access to most System pages. Admin has all privileges.

E-mail Escalation: Pause E-mails

Reset Pswd: Yes ☒ No Select Yes to reset the password of the User that is selected above, User 10 in this example. This will not effect you, the Admin user unless you change the password in the uppermost section, AAAA in this example. This will not reset any other users' password. Admin users cannot change a users password, only reset it. To change a user password, the user must log in and change it from the System User Setup page

Reset Submit

DCM510 Browser

10 Using the USB Port

10.1 Capturing Data

The DCM510 logs all sensors, flow switches, meter values, relay ON times, feed volumes and status every 5 minutes. This data is easily captured from the USB port located behind the communication light cover.

- 1- Insert a USB flash drive into the USB port shown. The OLED screen will acknowledge the drive

USB drive active
Offline, All STOP

LOG UPDATE CONFIG

F1 F2 F3

Phillips head screw

- 2- Choose F1, LOG to set up the download.

Select upload size
ESC to previous

DAY WEEK MONTH

- 3- Choose the amount of history, DAY [F1], WEEK [F2], or MONTH [F3]. When you choose the period, the download starts.

During the download, the keypad and browser connection are locked.

- 4- The display will show the progress of the download
- 5- Once complete, the display will show the file name uploaded to the USB flash

drive (ending in "csv"), the size of the file in number of records or time stamps, and instructs you to remove the drive to return the controller to normal operation.

- 6- Don't forget to close and re-secure the access door to assure the interior of the controller is not subjected to moisture or corrosive fumes from the environment.

Select upload size
ESC to previous
Log#38 of 288

AL123_17_101.csv
2288 Log records
Remove USB drive

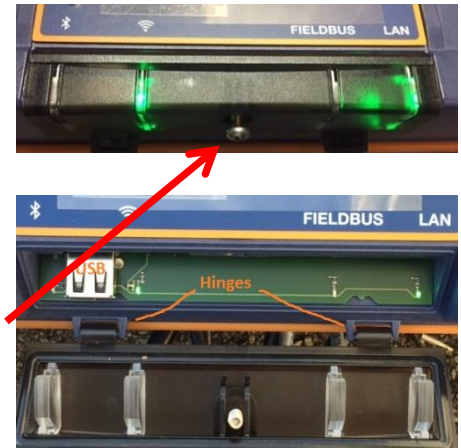


Figure 65 USB Access Door Closed [Top] and Open [Bottom]

No special conversion program or Excel add-in is needed to import the CSV formatted data into Microsoft Excel® or similar spreadsheet programs. Refer to your spreadsheet or graphing software product to learn how to import CSV data. (CSV = Comma Separated Value). The I/O data is stored in 5 minute intervals. (Not adjustable). Values shown are as taken, not averaged over the 5 minute period. Relays show ON time in seconds if on/off. Frequency outputs in volume (mL).

| | A | B | C | D | E | F | G | H | I | J | K |
|----|-------------|-----------|-----------------|-------------|-------------|------------|-----------|------------|-----------|----------|------------|
| 1 | DCM5 | | | | | | | | | | |
| 2 | Serial num | Site name | Controller name | Firmware | | | | | | | |
| 3 | | | | | | | | | | | |
| 4 | 123 | W P Stein | Hot Tub | 17.06.05.00 | | | | | | | |
| 5 | Log records | | | | | | | | | | |
| 6 | I/O | Location | A | B | C | D | E | F | G | H | I |
| 7 | I/O | Units | uS | mpy | ppm | ppm | pH | mV | mA | F | mA |
| 8 | Date | Time | Conductiv | Corrosion | CLE3 Chlori | CTE Chlori | pH Sensor | ORP Sensor | 4-20mA in | Temperat | 4-20mA Out |
| 9 | 20/06/17 | 10:45:00 | 0.85 | 0.002 | 0 | 0 | 6.73 | -4 | 0.017 | 68.242 | 20 |
| 10 | 20/06/17 | 10:40:00 | 0.85 | 0.002 | 0 | 0 | 6.73 | -4 | 0.015 | 68.109 | 20 |
| 11 | 20/06/17 | 10:35:00 | 0.85 | 0.002 | 0 | 0 | 6.75 | -4 | 0.017 | 67.693 | 20 |
| 12 | 20/06/17 | 10:30:00 | 0.85 | 0.002 | 0 | 0 | 6.74 | -4 | 0.017 | 68.319 | 20 |
| 13 | 20/06/17 | 10:25:00 | 0.85 | 0.002 | 0 | 0 | 6.74 | -4 | 0.017 | 67.822 | 20 |
| 14 | 20/06/17 | 10:20:00 | 0.85 | 0.002 | 0 | 0 | 6.75 | -4 | 0.017 | 68.071 | 20 |
| 15 | 20/06/17 | 10:15:00 | 0.85 | 0.002 | 0 | 0 | 6.78 | -4 | 0.015 | 68.093 | 20 |

Table 20 Partial example of captured data

DCM510 Browser

10.2 Save or Load the Program Configuration

THIS IS NOT THE FIRMWARE INSTRUCTIONS. See [10.3 Firmware Upgrade](#)

A program configuration is a list of instructions that the user can edit. Set-points, calibrations, names of I/O are all saved in the program configuration. You can save the configuration via a USB drive for backup purposes or to clone another controller. (Save from one controller and Load the configuration onto another.)

To see how to access the USB port, see section [10.1 Capturing Data](#).

10.2.1 Saving to the USB

- 1- To **save** a copy of your current program onto a USB drive, insert a USB into the USB port located behind the Communication panel.

- 2- Press F3 Config

| | | |
|--|--------|--------|
| USB drive active Offline, All STOP | | |
| LOG | UPDATE | CONFIG |
| F1 | F2 | F3 |
| Configure file No file found SAVE=capture config: SAVE BACK | | |

- 3- f you have not previously saved a program on this USB you can only F1 SAVE a copy to the USB.

| | | |
|--|--|--|
| Configure file AC123_16_292.cfg SAVE=capture config: SAVE NEXT LOAD | | |
|--|--|--|

- 4- f you have a previously saved program, you have the choice of saving F1 or loading F3.

In either case, press F1 SAVE to copy the current configuration to the USB drive. When the save is complete, the display will notify you to remove the USB drive.

| |
|--|
| AC123_16_292.cfg complete Remove USB drive |
|--|

10.2.2 Loading from the USB

- 1- To load a previously saved program from the USB to your controller, insert a USB into the USB port located behind the Communication panel.
- 2- Press F3 Config.
- 3- Press F3 Load.
- 4- The controller loads the program from your USB and notifies you to remove it.

Sometimes referred to as “Cloning”, a saved program file can be loaded onto a different DCM510 controller. They will then have the same configuration. Afterwards, you can edit either program via the keypad or with a PC, etc.

| | | |
|--|--------|--------|
| USB drive active Offline, All STOP | | |
| LOG | UPDATE | CONFIG |
| F1 | F2 | F3 |
| Re-configure file Writing 6 SAVE=capture config: SAVE NEXT LOAD | | |

| |
|---|
| AC123_16_292.cfg Complete restarts Remove USB drive |
|---|

DCM510 Browser

10.3 Firmware Upgrade

If necessary, your controller can have the firmware upgraded. Firmware is a set of instructions which tell the controller CPU how to operate. Firmware is not your 'program configuration' which determines which relay operates when and how. The program configuration can be saved and if needed, re-loaded, or copied to another controller. See section, [10.2 Save or Load the Program Configuration](#)



1 File Please

To avoid accidents and confusion with this important process, please remove all files from the USB drive prior to adding the .hex file. The controller will only allow you to view one file. Be sure you copy the correct file to the USB. If you have more than one, you may load the wrong file.

- 1- Obtain the hex file from ProMinent and insert thumb drive with the new file into the USB port located behind the Communication panel. See section [10.1 Capturing Data](#).
- 2- Press F2, UPDATE
- 3- The display shows the one file from the USB drive; APQ17060500.hex and the current hex file in use; Running:16.10.13.00. NOTE: These numbers are date codes, year, month and day. '00' indicates they come from the USB drive.

| | | |
|---------------------------------------|--------|--------|
| USB drive active Offline, All STOP | | |
| LOG | UPDATE | CONFIG |
| F1 | F2 | F3 |

| | | |
|--|--|--|
| Program file APQ17051300.hex Running:16.10.13.00 NEWPGM OLDPGM BACK | | |
|--|--|--|

F2 "OLDPGM" is a list of hex programs on the controller. If OLDPGM is not a choice, there are no other backup hex files in the controller memory. You can load a previous program from this list.

- 4- **If the file on line 2 is the new firmware file**, press F1 NEWPGM to select the new hex file. Press F1, Load to install the new hex file.

| | | |
|---|--|--|
| Program file AP17051300.hex Running:16.10.13.00 LOAD NEXT BACK | | |
|---|--|--|

- 5- Remove the USB drive when prompted.

| | | |
|--|--|--|
| Program file OK. Ready to program Remove USB drive | | |
|--|--|--|

NOTE: OLDER FIRMWARE VERSIONS USE STEP 6.

- 6- The firmware is copied to the controller. When complete, the controller will notify you to remove the USB drive.
- 7- After you remove the drive, the controller will erase the existing firmware and install the new one.
- 8- Once the new firmware is installed, the controller will restart.

| |
|---|
| Copying.... Program file AP17051300.hex 0.02% Complete |
|---|

| |
|---|
| Copying.... OK. Ready to program Remove USB drive 100.00% Complete |
|---|

| |
|---------------------------|
| Erasing Program memory |
|---------------------------|

| |
|--|
| Loading AP17051300.hex Record# 0 |
|--|

| |
|------------------------------|
| Hardware startup Now..... |
|------------------------------|

DCM510 Browser

10.4 E-mail Reports and Alarms

The E-mail function is explained in the DCM510 Browser manual. You cannot access this feature through the keypad. The following explanation is for informational purposes only.

The E-mail tool can send three types of information; Alarms, Status and Daily data. Setup is via a PC or smart phone browser.

During controller power up or reset, E-mail initializes as disabled.

10.4.1 E-mail Types:

10.4.1.1 ALARM: Sent once when an alarm first occurs.

Lists all active alarms.

Includes enabled sensor, meter & contact values for alarm context

User Enabled/Disabled.

10.4.1.2 STATUS: Sent @ noon every day (12:00). Verifies that the controller is running & on the LAN.

Includes enabled sensor, meter & contact values.

Sent @ midday so that commercial systems will have some run time and some day is left to respond to operating issues.

10.4.1.3 DAILY: Sent @ midnight (23:59) every day. Verifies that the controller is running & on the LAN.

Includes enabled output run times or volumes and sensor, meter & contact values.
User Enabled/Disabled.

All types send comma delimited values(CSV); one line per I/O or Alarm so that the both the subject & body can be easily parsed into a logging app, a typical use for the DAILY type.

Will make text-to-speech entertaining (bit encoded value-states are therefore intentionally excluded).

DCM510 Browser

11 Appendices:

a. IO Namespace: Letters & Numbers

The controller uses the letters 'A' to 'Z' to refer to sensors, meters, contact sets & 4-20mA outputs.

The numbers '1' to '9' refer to digital output controls. These can be AC relays, dry contact relays or digital solid state DC outputs for pulsed or on/off control.

Users can assign site specific names to all of the I/O, A-Z & 1-9. The I/O letters & numbers are a convenient, compact way to describe both the physical location of the I/O within the controller enclosure & the capabilities of each I/O.

Some letters are 'phantom', meaning they don't have physical wiring location within the enclosure. 'Phantoms' are used to represent calculated & derived values that are logged, alarmed & may be used for control.

| I/O | Type | Notes |
|--|--|---|
| A-B | Serial sensors | 3 wire Conductivity-Flowswitch-Temperature or Corrosion Rate or Differential pressure sensors |
| C-D E-F I-J | Dual sensor driver cards 6 types in any combination | pH-ORP: configurable as dual pH or dual ORP or pH-ORP 4-20mA input 4-20mA output Conductivity pH & 4-20mA input Dual serial sensor |
| G | Built-in 4-20mA input | |
| H | Built-in 10mV/C temperature sensor input | Used with legacy DCM5 'SGT' temperature sensor |
| K-N | Phantom sensors | Calculated (Inventory, Manual, Combined Chlorine, LSI/Ryznar, Flow Rate) or derived from other sensors & meters |
| O-V | Volume meter & contact set inputs | Each of 7 inputs configurable as Turbine, Contact Head meter or Contact Set. A second System flowswitch will reduce this to 6 inputs. |
| W-Z | Phantom volume meter & contact set inputs | Derived from other sensors & meters |
| 1-2 | Line powered control relays | Form C, powers pumps, solenoids & motorized valves |
| 3-5 | Dry or line powered control relays | Form C, may be used dry or powered. |
| 6-9 | Pulse or ON/OFF controls | Dry contact sets used to pulse or enable pumps, alarm... 24V 250mA max. |

DCM510 Browser

b. Input Attributes & Phantoms

Many of the sensors connected to the controller have attributes other than the default value. For example, the serial conductivity sensor measures conductivity, temperature & includes a flowswitch. The conductivity is the default value of the sensor connect to input 'A' (attribute A0) & the Temperature (attribute A1) & the flowswitch (attribute A2).

Notice that the A1 attribute is of the same type as the A0 attribute, both are analog sensor values but the A2 attribute is a contact set attribute (ON/OFF).

Attributes can be assigned to phantom inputs where they are logged, alarmed & used for control. A phantom input cannot be assigned to another phantom. (prevents circular references).

Phantoms in the **K-N** space are analog sensors. Those in the **W-Z** space are volumes & contact sets.

| I/O | Type | Attribute x = I/O | Phantom |
|--|------------------------------|--|--|
| A-B | Serial Conductivity | x0 Conductivity x1 Temperature x2 Flowswitch | K-N K-N W-Z |
| | Serial Corrosion Rate | x0 Corrosion Rate x1 Pitting Rate (Imbalance) | K-N K-N |
| | Serial Differential Pressure | x0 Differential Pressure x1 Inlet Pressure x2 Outlet Pressure | K-N K-N K-N |
| C-D E-F I-J | pH-ORP driver card | x0 ORP or pH x1 Temperature if pH | K-N K-N |
| | Conductivity card | x0 Conductivity x1 Temperature if 'Conductivity' or 'Condensate' | K-N K-N K-N |
| | pH- 4-20mA input card | x0 pH x1 Temperature-pH side | K-N K-N |
| | Serial Sensor card | Identical sensors & attributes To A-B | |
| H | Temperature | x0 Temperature x1 Rate | K-N K-N |
| O-V | Volume meters | x0 Volume Today x1 Rate x2 Volume this Year x3 Volume total | W-Z K-N W-Z W-Z |

Use the x0 attribute if you wish to have one sensor display two values.

For example, using a conductivity sensor to measure conductivity & salt concentration or to have additional levels of alarms.

DCM510 Browser

c. 4-20mA Input Selectable Types

Knowing the sensor type connected to a 4-20mA input allows the controller to:

- A. Scale the input correctly for the selected sensor type
- B. Provide calibration & calibration limits appropriate to selected type
- C. Clamp the measured sensor values so that an open loop doesn't measure a negative ppm or conductivity

Select **Sensor Type** = Other if A,B or C not applicable

| Sensor Type | Span Options & units | mA Span | G=Gain, O=Offset Span not user modifiable |
|----------------|----------------------|---------|---|
| Unassigned | Generic 0-100 | 4-20 | User modifiable span G= 6.25, O=-25 |
| CBR Bromine | CBR 0-2ppm | 4-16 | G=0.167, O=-0.667 |
| | CBR 0-10ppm | 4-16 | G=0.833, O=-3.333 |
| CGE Chlorine | CGE 0-2ppm | 4-16 | G=0.167, O=-0.667 |
| | CGE 0-10ppm | 4-16 | G=0.833, O=-3.333 |
| CLE3 Chlorine | CLE 0-2ppm | 4-16 | G=0.167, O=-0.667 |
| | CLE 0-10ppm | 4-16 | G=.8333, O=-3.333 |
| | CLE 0-20ppm | 4-16 | G=01.56, O=-06.6 |
| | CLE 0-50ppm | 4-16 | G=4.125, O=-16.50 |
| | CLE 0-100ppm | 4-16 | G=8.333, O=-33.33 |
| CLO Chlorine | CLO 0-2ppm | 4-16 | G=0.167, O=-0.667 |
| | CLO 0-10ppm | 4-16 | G=0.833, O=-3.333 |
| CTE Chlorine | CTE 0-2ppm | 4-16 | G=0.167, O=-0.667 |
| | CTE 0-10ppm | 4-16 | G=0.833, O=-3.333 |
| Diff.Pressure | DeltaP 0-100psi | 4-20 | G= 6.25, O=-25 |
| pH-transducer | pH 0 to 14 | 4-20 | 4mA=-15.45pH 20mA=-1.45pH pH outside of 0-14 blocked G=-1.056, O=19.675 5.373mA=14pH, 18.6mA=0pH |
| ORP-transducer | ORP 0-1000mV | 4-20 | G= 62.5, O=-250 |
| Temperature | Temp. 0-100C | 4-20 | G= 6.25, O=-25 |
| Turbidity | Turb. 0-5000NTU | 4-20 | G= 312.5, O=-1250 |
| Ultraviolet | UV 0-100% | 4-20 | G= 6.25, O=-25 |
| | UV 0-1000wm2 | 4-20 | G= 62.5, O=-250 |

Notes:

1. Gain & Offset return to the table values @ Calibrate = Factory Reset
2. The preceding table applies to the ChemFeed version of the DCM510

d. Enabling-Disabling I/O & Adding-Removing Driver Cards

Inputs A-Z cannot be disabled if in use by another I/O for control, compensation, phantom link, etc. The disable option using the browser or keypad is replaced with a message telling you where the target sensor is used, so you can remove the dependency.

Note that the sensor can be used for control, compensation of other sensors & in the case of sensors with more than one attribute; as a source for phantom sensors.

When you disable a sensor, the compensation is removed so that if for example:

You disable a thermally compensated conductivity sensor and the thermal sensor is subsequently removed or disabled, there is no conflict when the conductivity sensor is re-enabled, but it's no longer thermally compensated.

When a **C-D**, **E-F** or **I-J** driver card is removed, all of the dependencies are removed on the next power ON. Outputs that use the removed driver sensor(s) for control have the control configuration removed. Other sensors which use the removed driver sensors are modified.

When you install a new driver, the sensor inputs default. For example adding a pH-ORP driver, configures for one pH & one ORP sensor on power ON.

Auto-Removing Phantoms:

Phantoms are auto-removed if they are derived from inputs \geq 'C'

If the Phantom is in use as an interlock a latching alarm is set.